IDENTITY IN THE DARK AGE

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Identity in the Dark Age

A Biocultural Analysis of Early Medieval Scotland

Volume I of II

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ABSTRACT

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This thesis explores identity in early mediaeval Scotland (ca 800-1300AD) using biological and burial deposition data. During this period Scotland was developing as a unified kingdom. The Norse, Scots, and Anglo-Saxons battled for political power. The Saxon and Irish Churches were pressuring for superiority over each other and over local beliefs.

Many research areas in bioarchaeology have moved away from the more simplistic processual approach after a renewed understanding of the complexities of human existence. However, this newer methodology has not been sufficiently applied to early mediaeval Scottish studies. Common doxa still permeates the discipline despite the lack of critical assessment. Doxa tends to separate the early mediaeval Scottish world into the circumscribed categories of Norse (or ‘Viking’) and native, Christian and pagan. These commonly accepted site designations regarding ethnicity and religion were used to assess three hundred and twenty-one individuals from 21 sites. These individuals were analysed macroscopically for age, sex, stature and limb ratios, craniometrics, joint degeneration and disease, musculo-skeletal stress markers, dental pathologies, and overall health and disease. This data was compared to the available documentation for the sites considering site location, body position, cemetery type, grave enclosures, and grave furnishings. Statistical and qualitative methods were used to compare the data.

Results suggest that there are slight differences within the population that may suggest some legitimacy for common site designations; however, the overall conclusion implies caution in the use of oversimplified categorising and a generally egalitarian view of identity for the early mediaeval people in Scotland.

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CHAPTER 1

Introduction

1.1 Premise

This research began with Vikings. The proposal was to locate and perform a bioarchaeological analysis of the Viking burials from Scotland. What became clear early in the project is that the terms 'Viking' and 'Scotland' are woefully simplistic, and at what point a grave or cemetery could be considered Scottish or Viking was unclear.

The time period following Rome's historical withdrawal from Briton (ca 400AD) has traditionally been called the 'Dark Age' (Broun 1994, Gray 1922, Hedges 1993). The reason for this is, in part, the minimal written documentation concerning Briton during this time period. In addition, archaeological investigations have uncovered a layer of 'dark earth' covering the earlier settlement sites (McCarthy *et al* 2014a, Nenk 1990). In Scotland, the 'Dark Age' is even more unclear. Roman records concerning the area north of Hadrian's Wall are minimal (Cleary 1999, Hanson 1999). Subsequent to the withdrawal, they are relatively non-existent (Hills 1999). Archaeological preservation in Scotland is often sporadic, and grave finds in this period have been minimal. This has served to continue the concept of a 'Dark Age'.

Traditionally, the 'incursion' of the Vikings into Britain (ca 800AD) has marked a new era in both historical and archaeological studies (Crawford 1987, Graham-Campbell and Batey 1998). The survival of documentary sources, along with more preserved archaeological sites, has promoted the concept of a separation between the 'Vikings' and the 'Scots'. At the turn of the 9th century, studies in Scotland quickly become divided into separate camps: Viking/Norse—Native/Scottish, and the de facto camps of pagan and

Christian. While placing items into rigid categories has been increasingly criticised in the literature (Arnold and Wicker 2001, Gowland and Knüsel 2006, Halsall 2011, Petts 2011), these concepts have yet to be tested for 'Dark Age' Scotland. Therefore, the aim of this research changed from the location and analysis of 'Viking' graves, to an investigation of identity in early mediaeval Scotland through a biocultural analysis of the mortuary archaeology.

1.2 Time Frame: 8th to 13th Centuries

As mentioned above, the original goal of this research concerned Viking bioarchaeology, not specifically Scottish. It is not clear when the Vikings first set foot in Scotland; however, the beginning of the Viking Age is generally accepted as the end of the 8th century AD (Barrett 2003, Crawford 2000, Graham-Campbell and Batey 1998). Prior to the 'Coming of the Vikings', the territory that is now modern Scotland was divided into smaller kingdoms and tribal areas. Historically speaking, the Scots themselves only possessed the land and islands on the very western side, known as Dal Riata (Fg 1.1, Barrett 2003, Broun 2004, Jennings *et al* 2009). The remainder of what is now Scotland was historically divided into many different kingdoms. Once the Vikings arrived, their territory expanded across the islands and coastal areas (Fg 1.1 'Norwegian Settlements').

The 'Coming of the Vikings' is generally considered a new era in the history of Scotland (Graham-Campbell and Batey 1998, Ritchie 1993, Woolf 2007). The 'Viking Incursion' has also acted as a general marker for the beginnings of state formation in the North Atlantic and in the wider European theatre (Bartlett 2003). This includes Scotland, whose formation as a definitive state was underway by the end of the 8th century (Moffat 2005, Woolf 2007). Historically speaking, by the end of the 13th century, Scotland was a full-fledged nation. It is this period of nation-making which changed the 'barbarous

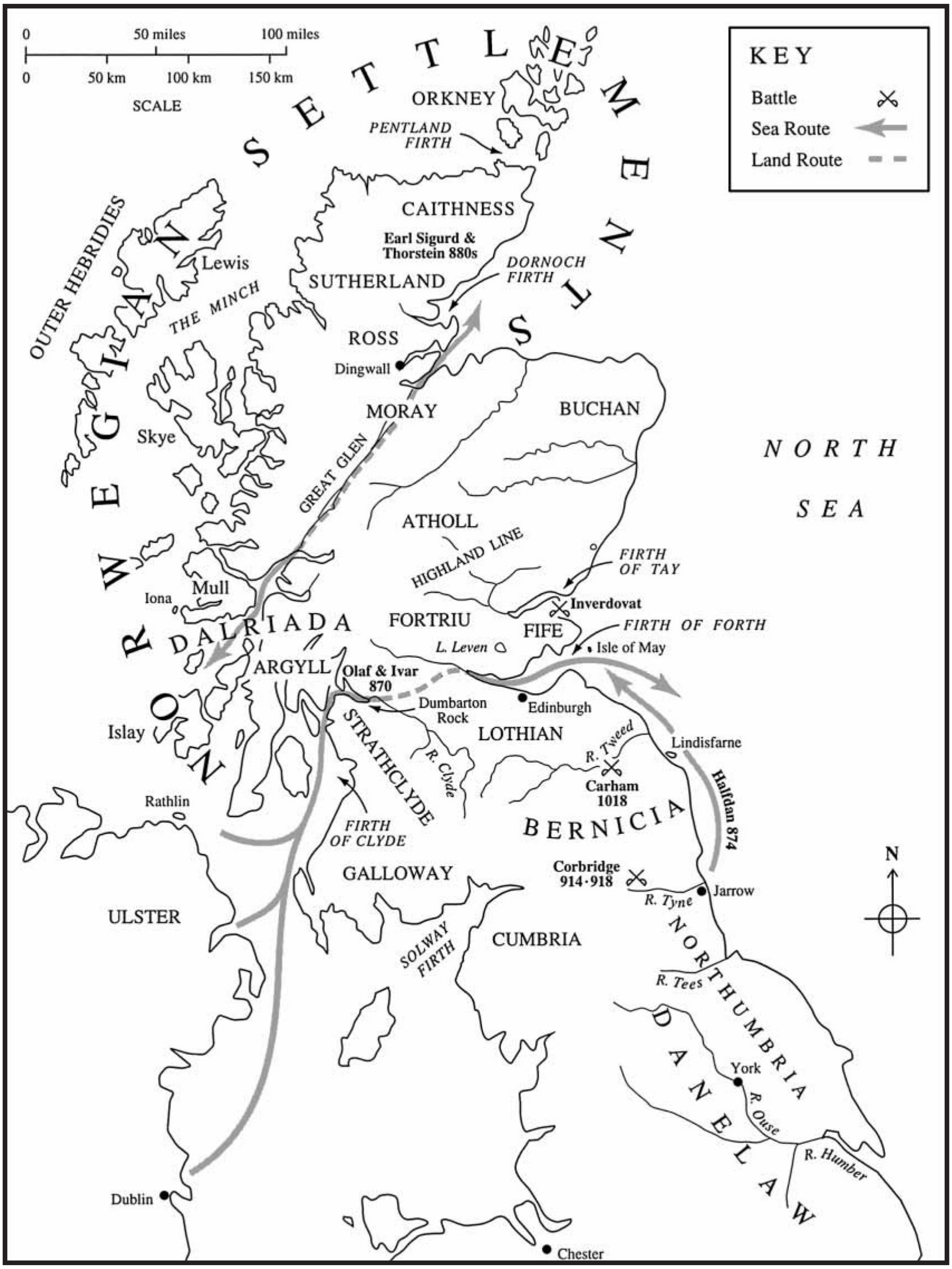

Figure 1.1, Historical Areas of 9th to 11th Century Scotland (Modified from Crawford 2000: 126).

peoples with diversities of language and customs that...we have scarcely ever seen even among closely related peoples' (Aelred of Rievaulx in Stringer 2005: 40) into 'us Scots...in this poor little Scotland' (Declaration of Arbroath in Cowan 2003: 4). Therefore, it is the late 8th to the early 13th centuries upon which this thesis focused.

1.3 Where: Modern Scotland and Cumbria

Geographically speaking, modern territorial borders are often not applicable when superimposed on studies of the past. As previously noted, at the beginning of this study period (late 8th century) the only territory which could historically be considered ‘Scotland’ lay on the western coast and Inner Hebrides (Crawford 2000, Jennings *et al* 2009). Most of the modern territory of Scotland was controlled by small kingdoms and tribes, many of which expanded well *outside* the modern Scottish borders (see Broun 2004, Downham 2004, and Duffy 1992 for further on this topic). The Hebrides did not become part of the Scottish Crown until 1266 (Gray 1922, Calswell 2010). The Northern Isles did not officially join the Kingdom until 1472 (Crawford 2013). What is now Cumbria changed hands between the English and Scottish crowns until 1157; however, the border continued to be disputed—sometimes violently—until the Act of Union in 1603 (Barrow 1966, Summerson 2004, Tuck 1986).

Although political boundaries can also mark cultural area, this is not always the case. As the early mediaeval boundaries were somewhat uncertain until the turn of the 17th century, a broader territorial scope seemed germane to this study. However, time and available resources were also a factor. Thus, the research territory was limited to the modern boundaries of Scotland with the addition of Cumbria.

1.4 Who and Why?

In Scotland, the ‘Viking’ presence has traditionally been viewed as an intrusion; bringing distinct biology, language, customs, architecture, and—pertinent to this thesis—mortuary forms (Crawford 1987, Graham-Campbell and Batey 1998). Traditional theories of Scottish identity place a relatively opaque and binary division between the ‘Scottish’ and the ‘Viking’. The ‘Viking’, presence has generally been considered unique and, therefore, ‘easily’ identifiable in the archaeological landscape.

Graves from early mediaeval Scotland have been an area of interest from at least the 17th century. By the Georgian era, unearthing ‘pagan’ graves had become a popular pastime; however, this tended to be more for the treasure of the grave goods than systematic study (Brown 1980, French 2014, Sweet 2004). Although there are exceptions, in general, human remains, along with the environment in which they were buried, were considered neither valuable or interesting. The value of stratigraphy, context, spatial relations, careful excavation, and careful recording were not appreciated. In many study areas there is a solid modern history of critical rethinking of many of the theories and methods put forth by these early investigators (Costa 2009, Graham-Campbell 2004, Jennings *et al* 2009, Maldonado Ramírez 2013). The study area of early mediaeval Scotland, however, has yet to fully critique the antiquarian legacy left to the discipline.

Much of the previous research into ‘Dark Age’ Scotland began with the premise that the territorial areas directly translate into distinct material culture, belief systems, ethnicities, and even physical appearance (Chalmers 1802, Pinkerton 1789). The Vikings were believed to be pagans from the area now known as Scandinavia. In Scotland, specifically, they purportedly came from southern Norway (Crawford 2000, Woolf 2007). This produced, in theory, a population which was distinct from the natives they displaced. Once the Vikings settled in Scotland and accepted Christianity, the Norse (as they were now called) remained distinct from the rest of the Scottish people.

The concept of a conspicuous difference between the Norse and native Scots is not implausible. Language, for example, is a factor which can cause a separation between the speakers and the non-speakers; and further, the native speakers and those using a second language (Gebel 2002). This can ultimately lead to a separation in culture, ethnicity, and populations. Language, therefore, has been a common way to trace the ethnic origins of early mediaeval peoples in Scotland, particularly the Norse (Crawford 2000, 1995, 1987, Downham 2009); along with some work on the Gaelic and Brythonic origins (Costa 2009, Forsyth 1997, Lee *et al* 2010).

However, language, like most other aspects of identity, is altered, accepted, rejected and even abused for a multitude of reasons that are all situationally defined (Brubaker 2001, Gebel 2002, Moreland 2000). Thus, a person or people can speak one language and yet, without conflict, identify as an unrelated group. Those same people can also be seen as having a particular ethnicity, regardless of the language that they speak. Therefore, language is not always an accurate indicator of an affiliation with any particular group or of a particular concept of identity.

In the preliminary search for 'Viking' graves, it quickly became clear that the obvious, opaque line which separated the 'Scottish' graves from the 'Viking' burials was not so obvious and far from opaque. Burial is an expression of identity; and identity is an extremely complicated thing. It is personal and it is public. It is malleable and yet often immutable. In short, identity is rarely—if ever—easily categorised as one thing (Scottish) or another (Viking). Although, in the wider fields of bioarchaeology and mortuary studies, there is a strong background of critiquing such rigid notions of identity (Arnold and Wicker 2001, Gowland and Knüsel 2006, Halsall 2011, Petts 2011), this is not the case for early mediaeval Scotland.

1.5 Aims and Objectives

The aim of this project was to investigate the biocultural variation of the people in early mediaeval Scotland to illuminate how identity was understood and expressed. The current understanding of early mediaeval Scotland is based on two main assumptions which have yet to be fully evaluated. The primary assumption is the separation of Viking/Norse from the native Scots. The second, yet closely related assumption, is the separation between pagan and Christian. To fully understand identity in this ‘Dark Age’, these two assumptions need to be critically examined.

To accomplish this, the following objectives were undertaken:

1) Identify excavated burial sites in Scotland for this period.
   a) Identify those with accessible human remains.
   b) Assemble all information on the burial environment.
   c) Perform a macroscopic analysis of the human remains.

2) Identify comparable archaeology and documentary sources.

3) Analyse data collected to assess any notable variation between groups; such as: age, sex, religion, cemetery style, and status.

Studies in early mediaeval Scotland have tended to separate the Scottish from the Norse and the pagan from the Christian. If these assumptions are accurate, analyses of the burial sites should bear this out.

1.6 Terminology: the Problem of Meaning

In a thesis such as this, wording is excessively important and yet, often impossible to render precisely right. Language is fluid. It shifts in a myriad of directions to meet the demands of communication and can still fall short of the mark. It is also improbable to define terms which are, by nature of this thesis, in the process of being explored. Therefore, the meanings given below were meant to give a general guideline for understanding the thought process behind this research, not concrete definitions of concepts which are, themselves, malleable.

1.6.1 Viking

‘Viking’, as a capitalised word, is commonly used to signify an ethnicity or even ancestry. This is, however, inaccurate. Viking is a profession, not an ethnicity (Brink 2009: 6, Downham 2012:1). That having been said, the term ‘to go a viking’ did originate from Old Norse (Gordon 1981, Zoëga 1910), and in theory, the predominate cultural traits of a viking are based in those that come from these ‘Scandinavian’ areas in the early mediaeval period.

The vikings, however, were pirates. They sailed wherever their ships would take them, and anyone willing to join the crew was taken on board. Source material and archaeology suggest that vikings made it as far as Newfoundland in the west and Turkey in the east (Barrett 2003, Brink and Price 2009). This is a large geographic area from which to gain and lose crewmen. This is also a large field from which to draw new ideas and in which to share concepts; morphing identity constructs with each interaction.

Prior to this section, ‘Viking’ was capitalised in deference to the meaning traditional researchers have given it. For the remainder of this thesis, viking will remain uncapitalised unless specifically used in the traditional way. In these instances the word will be given in quotes: ‘Viking’ vs viking.

1.6.2 Norse

In modern, traditional scholarship, the term Norse is used specifically to mean a connection to Norway, while Dane is used to indicate a connection to Denmark (Downham 2005). This distinction, however, is more the product of the modern nationalistic movement than an early mediaeval usage (Downham 2012), and that separation is was made in this thesis. Here, the Norse are peoples whose language and culture, both tangible and intangible, originated in the area which is now in modern Scandinavia: Denmark, southern Norway, and southern Sweden. The term ‘Norse’ is often used synonymously with ‘Viking’; however, while connected to vikings, only some Norse were vikings and not all vikings were Norse (Section 1.5.1).

1.6.3 Scot

As the least amount of documentary evidence was for these people, this term of ‘ethnicity’ is the most difficult to define. For the purposes of this thesis, the term Scot has been applied to those whose language, culture and customs originated in the geographic boundaries defined above but were not Norse in character. Due to its imprecise nature, this term was used minimally and has been exchanged for the more accurate term ‘native’.

1.6.4 Grave

In its broadest sense, a grave is a deposition site of a corpse. For the purposes of this research, a grave was defined as a physical space within the earth in which a body or bodies have been placed.

1.6.5 Grave Goods

The concept of grave goods is generally understood as anything purposefully deposited in the grave with the body or bodies. However, as it is difficult to know the intent of the depositor, knowing whether to label an item a grave ‘good’ rather than an ‘incidental’ can be problematic. For example, if a corpse were buried in a shroud which is stitched, archaeologically speaking, nothing will be left in the grave but the bones. If an individual were buried in a shroud closed by a pin, the pin may survive and have been discovered along with the bones. Does this, then, make the shroud pin a grave good, or is it incidental?

Corpse enclosures (’coffins’) are also problematic, particularly in dealing with diaspora ‘Viking’ graves. A cist, for instance, will not commonly be treated as a grave good; however, a boat—a not uncommon enclosure type in Norse burial form—is commonly listed among the grave goods.

Due to the sporadic access to records, for the purposes of this research, the term is used in keeping with the goods listed by the original recorders. This normally includes anything macroscopically and archaeologically visible within the grave which is not a part of the corpse (bones, hair, and skin for example). This does not necessarily connote intent, nor does it take into account items which did not survive taphonomy. This does discount most enclosure types outside of the commonly recognised ‘Viking’ forms (see Chapter 3). For the bulk of the sites in this research, decomposed organic matter was not taken into account by the original researchers, nor was microscopic analysis a purview of this thesis.

1.6.6 Religion: Pagan vs Christian

At its base, the term ‘Christian’ indicates a belief system which begins with Jesus and is governed by the Bible. Paganism is, by default, any belief system which is not Christian. There are a multitude of problems with these two definitions, some of which has been examined over the course of this thesis. However, as an aim of this research was a preliminary examination of the validity of the traditionally accepted concepts related to early mediaeval Scotland, the general meanings attributed to ‘Christian’ and ‘pagan’ by previous researchers has been used throughout the analysis.

1.7 Progression of the Thesis

The chapters following are a discussion of identity in early mediaeval Scotland as exhibited through the physical body and its mortuary deposition.

As this is a new exploration, with little previous research which relates directly to the subject, a broader survey was deemed prudent.

Chapter 2 examines the concept of identity across the early mediaeval North. This examination begins with a review of the concept of identity as it is understood in the broader literature. This is followed by an overview of the concept of identity as it appeared to be across Northern Europe in the early mediaeval period. This includes concepts such as: honour, age, gender, kinship, occupation, spirituality and disability. Chapter 3 outlines the basics of burial in the early mediaeval North. This outline includes a look at landscape settings, grave good usage, enclosure types, body positioning, and ritual (or spiritual) significance. A brief synopsis is given of burial in early mediaeval Scotland as it is currently known.

Chapter 4 discusses the body as it fits into the concept of identity and its role in archaeological theory. Modern science has illustrated that human remains themselves are an essential part of understanding the circumstances leading to the interment of that individual or individuals (Gowland and Knüsel 2006b, Sofaer 2006a). The concept of the body as 'material culture' (Sofaer 2006b) has been expounded upon thoroughly in recent years (Gowland and Knüsel 2006b, Gowland and Thompson 2013, Zuckerman and Armelagos 2011). Therefore, this chapter will provide a foundation and not an in-depth examination of the theory.

Chapter 5 describes the methods used in the analysis of the data collected for this research. This includes the initial resources and directories used to locate appropriate sites with human remains, along with an enumeration of the osteological and statistical methods used in analysis.

Chapter 6 reveals the sites investigated as part of this study. This includes the location of the sites, the environs, time period of the site, number of individuals and known layout of the graves.

Chapter 7 begins the presentation of the results. The mortuary environment findings are given. This includes a comparison of accepted site classifications (religious and ethnic) to the criteria used to make such assessments. This also includes an additional category, site type, which was discerned by this researcher in the course of the investigation.

Chapter 8 gives an account of the osteological findings. These include an analysis of age, sex, cranial and post-cranial metrics, stature and limb indices, entheseal attachments, joint disease and degeneration, and dental health and disease. This account is followed by a presentation of several compelling individual cases.

Lastly, Chapter 9 is a discussion of the results presented in Chapters 7 and 8. This discussion includes a consideration of the difficulties faced in the course of this research, along with a preliminary list of further research.

CHAPTER 2

Identity in the Early Mediaeval North

2.1 Identity: A Primer

Oxford Dictionaries defines identity as ‘the fact of being who or what a person or thing is’ (Oxford University Press 2013). This simple definition hides in it a multitude of interconnected and overlapping concepts: culture and ethnicity, familial role, sexual persona, personal conceptualisation, career, geographic origin, spiritual beliefs, and so on. Theories as to why and how identities are formed are as diverse as the researchers who postulate them (Díaz-Andreu and Lucy 2005, Lawler 2008). Whichever theoretical paradigm is used, it must be understood that there is rarely, if ever, a separation between one identity-concept and another. For example, if a woman stands between her parent and her offspring, is that woman a mother or a child? The simple answer is: she is both. Any given individual sustains many identities simultaneously (Díaz-Andreu and Lucy 2005, Foreman and Whetten 2002, Lawler 2008, Tarlow 2011).

Identity is not simple. The more extreme hive mind theories—hyper-collective consciousness or group identity—discount the concept of an individual (Kelly 1994, Rand 2013, Tindol 2012). If ‘individual’ implies a complete autonomy, then theoretically no individuals exist. However, identity begins—if it can be said to have a beginning—with the individual.

At its base, identity can be broken into two parts: the internal and the external. There is no clear separation between one and the other (Kwan and Sodowsky 1997, Vogler 2000). For the individual, internal identity is an individual’s own concept of who (s)he is and how (s)he experiences the world. The external personal identity is how other people view and understand that individual. Anyone who has, metaphorically, held their tongue has experienced a moment when internal and external personal identities have met.

The external identity is the main link in an individual's role in and connection to any given group identity (Bradby 2007, McFarland and Pals 2005, Nagel 1994). Group identities can be large or small: a family identity, ethnic and cultural identity, geographic identity, religious identity, and so forth. How an individual is viewed by others will dictate his level of acceptance into any given group. All identity rules, whether individual or group, are created, governed, and interpreted by the person or persons within in the identity itself (Díaz-Andreu and Lucy 2005, Rowlands 1993, Vogler 2000). That is not to imply that these identity rules are capricious. These rules, and the expressions of these rules, are contextually dependent.

Identity is constructed, maintained, and realised through a complex interplay of cognitive, emotional, and social processes. These processes are governed by particular motives (Becker *et al* 2012; McFarland and Pals 2005, Vignoles *et al* 2008). Generally, people are motivated to achieve and maintain feelings of self-esteem, continuity, distinctiveness, belonging, efficacy, and meaning. What accomplishes this for any given person or group varies, sometimes widely, across time, space, and across identities themselves.

Identities and identity rules can be stressed or unstressed, enjoyed or resented, imposed or denied, conflicted and steadfast, compartmentalized and united, and this can happen at the same time, and within the same identity (Baumann 1999, Feinberg 2009, Oring 1994, Tarlow 2011). This may or may not seem counter intuitive; yet this does occur.

Individuals (and groups) are not always fully cognisant of the reasoning underlying their motivation, nor the specifics of how the motivation translates into identity (Feinberg 2009, Reid *et al* 2008, Vignoles *et al* 2008). Individuals process their existence in an internal psychic space (Reid *et al* 2008, Vogler 2000). This becomes an individual's experience, which in turn is affected by further experience. Ultimately, this experience translates into knowledge. Processing is filtered through an individual's cognitive position; and this position is subject to the health, emotions, physical location, identities both past and present, current knowledge, goals and fantasies of the individual in question.

Identity rules often have a prescription for what thoughts and emotions are acceptable; however, this can ultimately be governed only by the internal personal identity (Schechtman 1996). If an individual were to write down his innermost thoughts, for example, the reception of those words will be filtered through language and through the perception of the receiver. What is meant by those words and what is actually understood are often different things (Feinberg 2009). Therefore, it is the external identity, both personal and group, which ultimately leaves any impression on the world.

The rules of any given identity are commonly made of the characteristics of its member(s) (Bradby 2007, Feinberg 2009). This can include speech patterns and usage, phenotypic appearance, dress and mannerisms, actions, objects to have or not have, how to use or not use objects, and so forth. Rules of identity tend to be fluid (Díaz-Andreu and Lucy 2005). Again, this does not indicate capriciousness. These rules will change in accordance with changes to the associated identity.

Motivations behind any given identity are theoretically similar for all identities; yet, a different way of satisfying those motives is usually relevant for each identity (Bradby 2007, Karney and Bradbury 1995, Reid *et al* 2008). Thus, the rules for every identity will vary. The expressions of each identity will also vary in accordance with those rules.

Identity expressions are the actions and objects that the identity rules govern. Actions show the level of participation in the rules of a given identity (Kwan and Sodowsky 1997, Oring 1994). Actions can be just that: a movement, a stance, inaction; or actions can produce objects. These objects, the material culture of an identity, can illustrate one person's or many people's participation in an identity. An object can be used in an action, be created by an action, or it can stand alone. The expression of identity by action, object or both is contextually based. Thus, understanding the identity behind the material culture will only be relevant within the context that created it (Berggren and Stutz 2010, Rowlands 1993). After all, many identities use bowls. Many identities use the same bowls: same size, colour, shape, and even from the same manufacturer. It is what is done with that bowl which reveals identity.

Ultimately, it is the external identity that is accessible to any outsider (Reid *et al* 2008, Vogler 2000). Understanding an external identity can be based only on the expressions of the insiders of that identity: the actions and objects; and then an attempt made by the outsider to extrapolate meaning (Karney and Bradbury 1995, Reid *et al* 2008). Motivations across identities may be relatively similar; however, the expressions used to accomplish those motives can vary from analogous to discordant (Becker *et al* 2012, Vignoles *et al* 2008). As an outsider to an identity, the expressions can easily appear counter-intuitive or even incomprehensible due to the outsiders own understanding of how motivations should be accomplished (Karney and Bradbury 1995, Reid *et al* 2008). This is difficult enough with living identities, where the outsider has the potential to witness expressions first hand. The further removed from the identity in question, the more of an enigma this understanding becomes.

2.2 Getting at Identity in Scotland using the broader North

In order to understand what someone *is*, it is important to *know* them. In the modern west, conveying this knowledge is generally accomplished by verbalisation. This is accomplished by email, text, voicemail, Skype or Facetime, video and text blogs, telephone, *et cetera*. While some of these methods only became readily available in recent years, face to face communication and writing/reading have been a part of our world for a very long time.

Our society is so acculturated to communicating identity through the verbalisation of identity that *knowing* about identities in the past has traditionally involved documentation. We call this ‘history’, and it encompasses places and times such as: classical Greece and Rome, ancient Egypt, and Anglo-Saxon England. In these areas, archaeology has traditionally worked to support history.

Prior to the Scottish Wars for Independence (1296-1357), documentation has either not survived or did not exist in Scotland itself. Even the *De Situ Albanie* is not much older—late 12th century (Sharpe 2008). Archaeologically speaking, remnants of stone structures and metal objects do exist; however, organic preservation is often minimal. This makes filling in documentary knowledge problematic. For this reason, there is only a certain amount of textual information that can be gathered from Scotland directly.

However, much of the surrounding geography has yielded a comparable wealth of historical and archaeological material. A portion of this material illustrates a direct connection between Scotland and the outside world, while giving us glimpses into the world of early mediaeval Scotland: *Egils saga Skallagrímssonar* (Smiley 2000b), *Vita Columbae* (Adamnan 1998), and *Battle of Brunanburh* (Kinsella 1995) to name some examples. There is also hoard and grave good evidence from Scandinavia and Eastern Europe which suggest, at minimum, cultural influence and trade connections from Scotland across the North Sea community (Ahronson 2000, Glørstad 2012) and further into the lands of the Crusades (McQuarrie 1997).

Traditional narratives of Scottish history suggest that there were four different linguistic groups: the Norse, Scots, Britons, and Anglo-Saxons; with the general assumption that these four groups also represent distinct cultural areas (Fraser 2009, Woolf 2007). While the validity of this paradigm is yet to be determined, what is relevant is that Scotland held affiliations with the English (Anglo-Saxons); the Welsh (Cumbric Britons); the Irish (the Scoti); and the Norse world: Iceland, Norway, Sweden and Denmark, but also Greenland, Russia, the Netherlands, Eastern Europe, and Turkey.[1]

Historically speaking, at the end of the 8th century, people in the area now known as Scotland were mixed Christian and pagan. By the 13th century, Christianity had become the dominant religion. There are many recognised Christian centres in early mediaeval Scotland: Whithorn, Iona, and Portmahomack, to name a few. This type of site links Scotland to the wider Christian world, extending to Rome and Constantinople.

All of this is to illustrate that Scotland was not isolated during the early mediaeval period; and, while it can be tenuous to presume that information from areas outside of Scotland, such as Ireland, Sápmiland, or Estonia, will be directly comparable; drawing out instances which illustrate plausible interpretations of the Scottish data will help elucidate the meaning of identity in the early mediaeval period.

2.2.1 The Sources: Connections and Complications

Much of the early mediaeval North was an oral society rather than a literate one (Carruthers 1990, Green 1994, Innes 1998, Rowlands 1993).

1 Modern place names are used for simplicity.

During the 8th century, ‘writings’ from within Scotland mainly consist of picture stones and ogham carvings. The picture stones are, as yet, still undecipherable by scholars (see Lee *et al* 2010 and the rebuttal Sproat 2010 for a basic example). The ogham carvings were primarily used as a method of signature, with occasional brief messages included (Connelly 2015). At the end of the research period (13th century), Pictish symbols have given way to Norse ones and the ogham to runes; however, the type and amount of communication continues to hold.

Literacy was generally the purview of Christian males—especially monks (Bitel 1996, Carruthers 1990, Innes 1998, Wemple 1981). Thus, *eorum temporum* documentation tends to be biased towards the male, the elite, and the Christian; neglecting a considerable portion of the population. In addition, the documents which do concern Scotland are comparatively sparse and, perhaps more importantly, from an outsider’s perspective. Some of the literature used, namely the Norse writings, are written several hundred years *after* the stories are said to be taking place (Krag 2003, Skovgaard-Petersen 2003).

However, Scotland was a part of the world, not separate from it. Documentation from the period may not stem directly *from* Scotland; however, some of those documents do make references *to* Scotland (Cowan 1984, Driscoll 1998, Moffat 2007, Wormald 2005). Documents such as the Norse Sagas may have been written considerably later in time; however, they are probable reflections of earlier, oral traditions (Bäuml and Bruno 1972, Byock 1982, Gordon 1961, Hennig 1979). Referrals to the general populace do exist in *eorum temporum* documents in the law codes or as minor players in a particular story, such as the mention of a London merchant’s son boarding at an Augustinian priory in the 12th century (Barlow 1978: 232) or the establishment of a *ceorl’s wergeld* in the Anglo-Saxon lawcodes. Additionally, while identity constructs vary, the extant documentary sources do suggest a viewpoint broadly in common across the North.

Therefore, the remaining discussion of identity has drawn from both historical and archaeological sources from across Northern Europe which roughly conform to the late 8th to 13th centuries. This discussion details a general understanding of identity as it was broadly understood across the North.

2.3 Power and Weakness

Haltur ríður hrossi,	The lame can ride a horse
hjörð rekur handar vanur,	the handless can drive cattle,
daufur vegur og dugir.	the deaf can fight and prevail
Blindur er betri	to be blind is better
en brenndur sé,	than to burn on a pyre,
nýtur manngi nás.	no one wants a corpse.

Visa 71 Hávamál (Author's translation)

The challenges of being human were as familiar to Northern peoples of the past as they are today. Children tend to be weaker than adults; they can be less coordinated and less able to discern reason. Females tend to be physically weaker than males, particularly in upper body strength. Humans can be born with or acquire disability: blindness, deafness, club foot, and so forth. The body tends to become frail as time passes; this can be physical, mental or both. These challenges were not only understood in the mediaeval North, there were identity rules which accepted and governed these differences.

Most legal codes assured that a person was of accountable age and mentally capable of understanding the law before determining responsibility for breaking a law. Brehon law, for example, made infants and simpletons

(including those who have become senile) exempt from signing contracts (Kelly 1988, Ni Chonaill 2008). These Irish laws also exempted the blind, lame, leprous, and other infirmed persons from prosecution if a child should come to harm because of their affliction (Kelly 1988, Ni Chonaill 2008).
In addition, many of the Anglo-Saxon law codes delineate the difference between *geweald* (OE control) and *ungeweald* (OE out of control) for the purposes of determining an individual's accountability (Hall 1916; for further discussion of Anglo-Saxon *mens rea*, see Isaacs 1918).

Physical violence in defence of property or kin was an understandable action. Physical *abuse* was not. Brehon law stated that physical discipline of children should not leave marks nor should any correction involve 'harshness' (Ni Chonaill 2008). Violence against one's kin group, especially those who are less able to defend themselves, was unacceptable. The Visigothic Code demanded fifty lashes to anyone who abused their elders; children included (Harper Dunn 2006). A man hitting his wife was grounds for divorce in both Brehon and Norse codes (Bitel 1996, Jesch 1991, Ni Chonaill 2008). King Ælfred and Æthelred both enacted laws to protect nuns, widows and children (Bitel 1996, Halsall and Thatcher 1998a, Jesch 1991). Burgundian and Salian Frankish law applied heavy fines to anyone who cut a woman's hair (Harper Dunn 2006, Wemple 1981). Alamanic law forbade anyone to strike a woman and applied twice the fee for an aborted female foetus than male.

Actively seeking heroism was not necessarily required; however, if faced with a challenge, a person was to do their best to defend themselves, their kin, and even those who are vulnerable. Rape, for example, was considered particularly vile and the perpetrator was not only punished, but Salian law, Capitulary I, also punished anyone who stood by and did nothing (Harper Dunn 2006). Disability or weakness were part of the human condition, even expected, to some extent, within each individual (Lewis-Simpson 2008b, Metzler 2006, Sigurðsson 2008). Therefore, being weak either physically, mentally or emotionally was not disgraceful, in and of itself. However, it is using that weakness an excuse to do nothing, break an oath, or run away was an unacceptable act (Jesch 2001, Riisøy 2010).

In the early mediaeval North, being actively involved in one's own destiny and a productive member of society were the foundation of societal acceptance (Brundage 1984, Pakis 1991, White 2005). However, physical ailments came to everyone. This was a fact of life. Therefore, impairment alone did not necessarily make a person a societal outcast. As indicated in the Norse poem, *Hávamál*, at the beginning of this section; everyone who was alive was available to contribute, and being alive was better than the alternative.

It has been theorised that infants would have posed a burden on society and, therefore, would have been of little value (Boswell 1984, Crawford 1999, Lee 2011, Metzler 2006, Wicker 2012). However, excavations of child burials imply societal, or at least individual, care for infants and young children. A 6th-7th century mammiform pot was discovered alongside an infant grave at Barton-upon-Humber, England (Crawford 2000, Nenk *et al* 1991). In fact, an archaeological record of 'the bottle' continues in Europe to at least the late Bronze Age (Lacaille 1950).

Every individual held worth even from within the womb. Having or causing an abortion was a serious crime. *Lex Visigothorum*: 206 demanded two hundred lashes for a slave who voluntarily aborted her foetus and complete loss of freedom to a free woman who did the same (Scott 1910). *Lex Alamannorum*: 88.1 required twice the honour price if an aborted foetus was female: 24 *solidi* vs 12 *solidi* for a boy (Haenel 1865), as did the earlier *Lex Salica* and *Lex Ripuaria* (Wemple 1981). Most Germanic laws demanded twice the honour fee for killing a pregnant woman. In Ireland, a pregnant or nursing woman was worth *full* honour price, rather than the half of her father or husband's worth given for an unpregnant woman (Bitel 1996, Kenny 2007, Kinealy 2008). In Brehon law, the party guilty of causing an aborted foetus was required to pay both the mother's and father's family for the loss (Kelly 1988, Ni Chonaill 2008). Additionally, in Iceland, *Grágás* 95 forbids the killing of a pregnant woman, regardless of what crime she has committed, and if a pregnant woman is killed, the court should proceed with the prosecution of two deaths (Dennis *et al* 2006).

Further, many researchers have proposed that 'handicapped' or 'deformed' infants would have proven more burdensome and would have been particularly susceptible to infanticide or social derision. However, current research suggests otherwise. Excavations at 7th century Burwell and 11th-12th century Canterbury have revealed adults with cleft palates (Anderson 1994, Crawford 2010). As an infant, this condition would have involved great effort to insure that the individual survive; yet, at a time when infanticide would have been a simple solution, these people survived into adulthood. In the 6th century *Liber de virtutibus sancti Martini episcopi*, II. 24, Saint Gregory states that a mother did not dare kill her infirm child and would raise him(her) as any healthy one (Metzler 2006). Christian instruction and laws denounced both abortion and infanticide. The *Didache* 2:2 forbids both (Lightfoot 1990), and the Laws of Theodosius, CTh.11.27, confirm the law that all children should be allowed to live (Boswell 1984, Зарщиков *et al* 1998).

Generally, infirmity and age were linked (Metzler 2006, Sánchez-Martí 2008, Sigurðsson 2008). Old age brought physical debility, a common concept bemoaned in works such as the 9th century Irish poem *Caillech Bérri* (Ritari 2006) or the Anglo-Saxon poem The Seafarer (Gordon 1979). However, the compensation for infirmity was wisdom and this was a much coveted state. Old age was not a time for retirement; although, a shift in societal role may occur. Hildegard of Bingen, for example, founded convent in 1165 at age 67 and lived until age 81 (Flanagan 1989). While his exact age is unknown, Njál is definitely old and still a man with high honour when he is burnt to death in an Icelandic feud (Smiley 2000a). In contrast, Egill travelled the world, mingled with royalty, and wrote epic poetry; yet he was scorned in his old age because he spent his time bemoaning his old body and getting in the way of the work being done (Smiley 2000b).

Christian hagiography, especially, saw the infirm as an opportunity to illustrate the power of God through healing miracles (Gordon 1991, Finucane 2000). Chapter five of Metzler (2006: 126-85) has a good discussion of this as it relates to disability. Finucane (2000) looks at the Church's reports of miracles and the plight of children. The growth of the Cult of Saints created a host of opportunities for tales of Christian healing and income from pilrimage and hospice sites (Harvey 1993, Petts 2011, Schulenburg 2008, Talbot 2002). For example, Saints Cosmas and Damian were known for their medical powers (Metzler 2006). Their cult inspired places of pilgrimage across Northern Europe. Some excavations of medieval Church properties suggest the influence of these miracle stories. Human remains at sites such as Saint Adrian's on the Isle of May, off the Firth of Forth, Scotland (James and Yeoman 2008), or Magdeburg in Germany (Ricci 2010)[2] have yeilded a comparatively high rate of disease and medical conditions among the dead. This suggests that mediaeval people were travelling to these places in the hope of their own miracle.

In forms of burial which include grave goods, a correlation has been detected between a decline in number of goods and an increase in age (Gowland 2006, Halsall 1998). However, in work with early Anglo-Saxon graves, Stoodley (2000), has illustrated that while the type of goods altered

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2 See Section 2.7

with age, the number of goods did not decrease. In non-grave good burial forms, Buckberry (2004) found a strong correlation with old age and individuals buried in a coffin or a plank grave type at St Peter's Barton-on-Humber. Therefore, these graves may be evidence of a change in identity expression, but not necessarily a decrease in societal status.

2.4 From Conception to Childhood

The concept of gender in the mediaeval North generally manifested in keeping with the male-female dyad (Bitel 2002, 1996, Harper Dunn 2006, Kenny 2007, Norrman 2000, Wemple 1981). Age seemed broadly understood in a chronological manner (Crawford 1999, Greenleaf 1978, Helgadóttir Yershova 2008, Lewis-Simpson 2008a, Percivall 2008, Sánchez-Martí 2008, Stoodley 2000). However, physical, mental, and emotional development also played a considerable part in defining an individual's identity (Greenleaf 1978, Percivall 2008, Newman 2007, 2001, Orme 2001, Sánchez-Martí 2008, Sigurðsson 2008). An individual's role in society, including capabilities, determined the reparations due for any given offense against said individual (Dennis *et al* 2006, Kelly 1988, Stafford 2013). As stated above, this worth included the unborn.

For a newborn to become an official member of a family (and society), certain criteria had to be met. What these requirements actually were varied somewhat across the North, and surviving documentation is a bit unclear as to the exact specifications. However, the two primary criteria appear to be that a child needed to nurse (or consume 'earthly food') and the child needed to be introduced to and accepted by the father (Bitel 2002, 1996, Boswell 1984, Harper Dunn 2006, Jesch 1991, Mays 2000, Wemple 1981). Some documents also allude to a water ritual ranging from something akin to (but not the same as) baptism by sprinkling to a 'fitness test' with cold water (Mays

2000). The Lule Sámi of northern Sweden were still performing such a ritual well into the 20th century (Kleppe 2012). In this case, the Christian baptism needed to be washed away and replaced with the naming baptism or the child would not be able to find happiness. In the early mediaeval North, if the infant failed to complete the requirement(s); it was acceptable, in some cases expected, that the child would be exposed (Boswell 1984, Mays 2000).

Exposure has traditionally been synonymous with infanticide. Icelanders famously protested the cessation of child exposure when converting to Christianity ca 1000 AD (Sturlason 1884). Early Anglo-Saxon cemeteries are conspicuously deficient in graves of children under the age of three; however, this pattern alters considerably once Christianity is (historically) accepted (Crawford 2000). Children's graves in pre-Viking (known as the Iron Age in Scandinavian disciplines) and Viking age Scandinavia are also much lower than suggested mortality rates would imply (Wicker 2012). The lack of the very young in pagan cemeteries has been used as a proof of a pagan version of population control (Lawing 2013, Mays 1995, Wicker 1998). However, it is also possible that the very young were being dealt with, in a funerary sense, in a manner distinctive to older individuals. Crawford (2008), for example, noted that burials of infants and very young children do appear in domestic situations—under houses, and so forth—and has suggested a ritual significance to these occurrences.

Boswell (1984) proposes that exposure did not necessarily equate to death. He sees it as more of an opportunity in which only one option was the death of the child. Abandoned children could be adopted by a new parent, taken or sold as slaves, left for the Church to raise, or possibly die of exposure. The Laws of Theodosius, CTh.11.27, states that only parents with extreme need were allowed to sell their children (Boswell 1984, Зарщиков *et al* 1998), suggesting some credence to Boswell's suggestion. Not all parents had the ability, or perhaps the desire, to care for their children (Boswell 1984, Mays 2000).

In many Anglo-Saxon and late medieval English Christian cemeteries, the only group to be treated in a distinctive manner were the infants (Gilchrist 2012: 206-7, no exact ages given). This was generally manifest by clustering the infants together: under the eaves of the church or placing them together in one section of the cemetery, for instance. This suggests that children, particularly, held a special place in mediaeval England.

In Ireland and parts of Western Britain, an entirely separate burial ground was used for children, the *cilliní* (Donnelly *et al* 1999, Finlay 2013, Wilkins 2008). *Cilliní* have generally believed to have originated in the very early mediaeval period and were particularly used for unbaptised children; however, women and outsiders were also buried there (Donnelly and Murphy 2008, Murphy 2011). Recent work, however, has revealed that a many of the known *cillín* sites date to the late mediaeval or into the early modern period (Donnelly and Murphy 2008, Murphy 2011).

Christianity held that an individual must be baptised to enter the Kingdom of Heaven. Dissenting opinions did exist—the Pelagian heresy for one (Sparey-Green 2003); however, the official standing of the Church was to remain unchanged until well into the modern day. Although midwives in Christian areas were trained to give emergency baptisms (Crawford 1999, Newman 2007, Orme 2001), many infants died without undergoing this ritual. The word '*cillín'* is thought to derive from the Latin cella, little church or oratory. It is also suspected that these were religious sites that had fallen into disuse (Wilkins 2008).

Interestingly, the Church itself did not require interment in consecrated ground, but many parents sneaked into the Church cemeteries and buried their unbaptised children in secret, possibly in hope that the blessed ground itself would act as an intercessor for their child (Sparey-Green 2003, Thompson 2004). Keeping out these secret burials was one of the reasons Hereford Cathedral purportedly gave for enclosing the cemetery in 1389 (Herefordshire Council 2010). This connotes an, if but symbolic, attempt to ‘save’ the children from consignment to hell; implying a great level of care for the young.

Culturally speaking, once an infant matriculated into society, (s)he became a person and entered into childhood (Ariès 1962, Crawford 2000, 1999, Mejsholm 2008). This lasted until about age seven. In most cases the period of breastfeeding was an additional, initial subdivision and lasted from one to three years. Burials of children in this initial age set illicit little to no grave goods in societies where grave goods are common: for example, early Anglo Saxon and ‘Viking’ graves (Lucy 2001, Stoodley 2000, Thedéen 2009).

2.5 Fosterage and Family

In general, age seven was the end of childhood and the beginning of fosterage (Crawford 1999, Hansen 2008, Ni Chonaill 2008). Similar to modern foster care, fosterage in the mediaeval period could involve a child living in another household. However, the original meaning of foster was to support and parent (Harper 2013, Ni Chonaill 2008, Orme 2001). In the early mediaeval North, fosterage indicated that the fosterer became parent to the child. Some children were fostered by grandparents or uncles and aunts; however, it was more common for a non-blood relation to take on the role (Bitel 1996, Crawford 1999, Hansen 2008, Ni Chonaill 2008). In the early mediaeval North, fostering added to one’s kin group (Hanawalt 1986, Hansen 2008, Orme 2001).

Parents could be, and often were, in constant contact with the child (Boswell 1984). Fosterage, however, often provided a stronger bond than exists between the modern teacher and student; often even more than parent and child. Foster parents could easily become second or even primary parents in the eyes of the fosterling. Æthelstan, for example, remembered his foster-mother affectionately in his will for her great merit (Whitelock 1979). In Ireland, especially, one's *muimme*, foster mother, held a very significant place in a foster child's heart (Bitel 1996, Ni Chonaill 2008). In many legal codes, a foster child could inherit as an equal to one's biological children (Birdwell-Pheasant 1998, Salazar 1999, Stafford 2009). In Iceland, *Grágás* allows a foster father to kill for his foster daughter (Dennis *et al* 2006); and death of a foster child is one of the *only* instances in Brehon law (*Corus Fine*) in which retribution and blood feuding were actually *condoned* (Ni Chonaill 2008, Thornton 2009). Therefore, one's family and one's allegiances had more to do with kith than kin (Bartlett 2003, 2001, Geary 1983, Moreland 2000: 45).

Fostering continued until the age of majority. This generally occurred at puberty for males; although, this was not an absolute. In early Anglo-Saxon society, this age was twelve; however, there is some archaeological and documentary indication that this may have been as early as age ten (Buckberry 2004, Crawford 1999, Stoodley 2000). Lombardy and Ripurian law specified age twelve, Salic law age fifteen (Harper Dunn 2006, Wemple 1981). In Ireland the age for males was fourteen (Bitel 1996, Ni Chonaill 2008).

Females were generally considered minors until married. This seems to have been legally possible as early as twelve in most areas; however, this was not consistent across time or geography. In early Lombardy Law, for example, a woman *always* needed a guardian (Harper Dunn 2006). In Iceland a widow could collect inheritance or property income at age sixteen. If unmarried, a woman needed to wait until age twenty to gain those rights (Callow 2007).

In burial forms that include grave-goods, a correlation has been observed between the age of fosterage and the patterning of those grave-goods. For example, working in Viking Age Gotland, Sweden, Thedéen (2009) found a positive increase in female dress accessories, especially beads, from about age five. Williams (2006) noticed an increase in brooch inclusion in the seven to fifteen year age range at the Berinsfield, South Oxfordshire, cemetery.

For both genders, maturity and disposition seem to have been an important factor in determining the legal status of the individual. Parents could start fosterage early or hold off depending on the ability and maturity of the child. Æthalstan tried to raise the age of culpability to fifteen in ca 935, stating that it seemed cruel to harshly punish one who was so young (Halsall and Thatcher 1998b). An early manuscript of *Grágás* puts the age of culpability at twelve; however, a later manuscript sets the age at sixteen (Callow 2007, Sigurðsson 2008). Brehon law established societal rules starting at age twelve, but lessened the punishments given to ages up to seventeen (Ni Chonaill 2008).

2.6 Gender Roles

Essentially, individuals in the early mediaeval North possessed gender from birth and this generally followed the male-female dyad. However, this does not presuppose a strict, polarised system of gender construction, nor does this necessarily lend itself to immediate misogyny. As stated above, the foundation of identity in the North was being an honourable and useful human being. Therefore, a woman could hold as much respect and authority as a man.

Germanic laws varied across Europe; however, in general women were given almost equal standing with men (Bitel 1996, Clover 1993, Harper Dunn 2006, Wemple 1981). Visigothic law, for example, allowed women to prepare the contractual agreements for their daughter's weddings, and try their own business in court (Harper Dunn 2006, Wemple 1981). Any person had the right to defend their property; however, a man could fight outside the perimeter of his homestead. Women were expected to remain within the property boundaries.

Gendered roles tended to be more compartmentalised in the areas longest Christianised, such as Ireland and Burgundy (Bitel 1996, Wemple 1981). Galenist concepts heavily influenced the regulatory officials in these areas. To these theorists, the perfect person was an adult male (Stolberg 2003). Males were trustworthy, strong, intelligent, and faithful. Females were deceitful, sinful, lacking intelligence, and could taint men by their presence. Galenists recommended a strict separation of men and women (Bitel 1996, Green 2000, Stolberg 2003).

In Ireland, upon puberty, a woman legally lost half (or more) of her honour price (Bitel 1996, Kenny 2007), the only exception came to the pregnant or nursing woman. In Burgundian law, honour price was completely denied to a woman who fought outside her property boundaries (Harper Dunn 2006, Wemple 1981). In Ireland, a woman who broke the law deserved no honour price whatsoever (Bitel 1996, Kenny 2007). Irish women were unable to inherit their husband's land, and inheritance was passed to daughters only if there were no surviving sons (Bitel 1996). Merovingian women were legally dependent on their fathers or husbands (Wemple 1981), and Irish women were always legally defined in relation to her male guardian (Bitel 1996, Kenny 2007, 2006). Women could also be forced, sometimes violently, into marriage, and a Burgundian woman could be executed for breaking an engagement (Bitel 1996, Wemple 1981).

While the above may suggest a lesser status for women in Ireland and Burgundy, other elements suggest otherwise. In Ireland, for example, a woman was required to be given portable goods by her family upon marriage:

domestic animals, clothing, household supplies, and so on (Bitel 1996, Kenny 2007, 2006). This property was hers to pass along to her children and would be hers even if the marriage were to dissolve. Additionally, her father could give her land, and this land could be inherited by her daughters.

In fact, Kenny (2006), indicates that traditional codes were very different from the ideas of the Galenist jurists, and that these Gaelic codes were regularly followed by the Irish in complete disregard to Galenist ideal. While men did maintain guardianship of women, this seemed to be more of an honorary position. Women had consent over who they married, owned property, and were required to be consulted in matters of that property. Women presided as co-chieftains along with their husbands. Divorce was a relatively simple matter and could be instigated by male or female. The Gaelic tradition also designated women as the architects of society. They were the patrons of poets, whose job was to laud the characteristics of her husband. Women were also the main patrons of the Church (an interesting dichotomy for the Galenists).

In Burgundy, a husband could not execute court or property transactions for his wife without her consent (Wemple 1981). A widow fully assumed the position of her former husband. She was also given a bridegift, *dos*, from her husband to support her should the marriage dissolve. Also, even though her first marriage needed approval from her parents, any subsequent marriages she was free to make of her own volition (Harper Dunn 2006, Wemple 1981).

Male roles in the North have commonly been depicted as a cult of machismo, similar to modern Latino societies (Bitel 1996, Brink and Price 2009, Campbell and John 1991, Clancy 1998, Harper Dunn 2006). Prosaic writings of the time give glory to men who fight. Saga literature praises specific warriors like *Egill Skallagrímsson*, who was 'man' enough to avenge his own honour at age seven by killing the boy who cheated him (Smiley

2000b); or *Fergus mac Róig*, whose name itself means virile horse (Carson 2008). These prosaic writings do show some variation in a man's role in fighting. Written stories which have roots in Christianised areas, such as The Battle of Maldon (Gordon 1967), indicate a man should have loyalty to his leader and be willing to die for him and alongside him. Stories that have their origins in non-Christian areas, such as the early Anglo-Saxon tale of *Beowulf*, the Ulster *Táins*, and the Icelandic Sagas, all illustrate heroes who are loyal to family and are generally lone operators. The heroes in the 'pagan' stories may have companions—even a large retinue—but these other individuals are little mentioned and take a back seat to the hero of the story. The greater company of men in the 'Christian' stories are not necessarily named, but they tend to be kept in the forefront of the story's imagery.

Excavations of some 'pagan' graves have revealed weapons and armour as part of the grave good assemblages. In light of the epic literature, these weapon graves have traditionally been interpreted as males and as warriors (Härke 1997, James 1989). Osteological investigation, however, has revealed that several of these graves were occupied by females. Four definite and four possible female skeletons were buried with weapons and at Buckland, Dover, England (Evison 1987). At Nordre Kaupang, Norway, burials 2 and 10 were both osteologically and artefactually sexed as female—oval brooches being a primary indicator; however, both barrows also included an axe, a scythe, and a long iron rod (Moen 2010). At Bikjholberget Kaupang, an osteological female, also deposited with oval brooches, was placed with an axe and an arrow (Moen 2010).

Traditional German and Scandinavian archaeological theory in particular tended to view weapons, and most grave furnishings, as a direct possession of the interred individual (Härke 1990, Solberg 1985, Steuer 1989). This has become increasingly challenged as gender identity and funerary rituals are better understood. In Anglo-Saxon archaeology, osteological analyses has suggested that many of the individuals interred with weaponry did not have the muscular attachments which are often seen in soldiers or 'warriors' (Härke 1997). Some of these individuals have even been young children, and although an argument can be made for an apprentice in training, these children would likely have not yet been afforded the status of warrior (Härke 2004, 1990). Additionally, individuals in later Anglo-Saxon weapon graves show an increasing number of weapons and a significant lack of skeletal trauma. Härke, has therefore suggested that weapons graves may be symbolic, possibly as status symbols or family image (Härke 2004, 1990).

Epic literature from across the North Sea region tells tales of women warriors and rulers such as Medb in Ireland, Fredegund and Brunhild of Frankia, and *Auðr* the Deep Minded from the Norse sagas. There is a debate over the extent to which the 'Warrior Woman' motif should be believed (Acker 2006, Bitel 2002, 1996, Norrman 2000); however, women were banned from leading their people to war in the Irish Synod of Birr in 697 (Kinealy 2008), and it seems odd to ban something if it did not exist to begin with. Interestingly, according to Brehon law, a women could fully inherit property from their mother only if they provided military service in time of war (Kenny 2007, Newman 2007) otherwise they were allowed half of the inheritance. (Humphrey 2000). Alice of Abergavenny reportedly beheaded 70 men at the battle of Baginbun Head in 1170 (Conlan 1992). A late example of the warrior woman is of Dervorgilla O'Connor who joined her husband, O'Donnell, in the war against Rory O'Connor in 1315. She is recorded as leading the *galloglass* after refusing to accept the peace her husband negotiated (Kenny 2006).

As they are today, occupation types were highly varied, and although there was a general division of labour by gender, there was also considerable crossover (Hanawalt 1986, Newman 2007, Orme 2001). The peasantry, especially, tended to work together to perform the tasks of every-day living. Women were generally in charge of the household while men involved themselves in occupations outside the domestic arena; however, both girls and boys were taught animal husbandry and everyone participated at harvest time (Jewell 1996, Poole 2013).

Females raised in, or fostered to, mercantile families learned the trade, as did women who married a merchant (Hanawalt 1986, Kenny 2007, Newman 2001). Fourteenth century legal documentation suggests that making cider or ale was a common and long established way for a woman to contribute to the family upkeep (Bennett 1996, Jewell 1996, Kenny 2007, Newman 2001). If enough surplus were made, a woman could have a thriving industry. Dairying itself tended to be the occupation of women (Jewell 1996, Poole 2013); and women, too, were the main contributors to the wool industry (Bitel 2002, 1996, Jesch 1991). Men tended to do the shearing, but women carded the wool and produced the cloth (Hanawalt 1986, Pounds 2014). This was to remain the case until the 19th century industrial age, when men became the primary operators of the mechanical looms.

As the number of Christians increased, the number of fosterlings dedicated as oblates also increased (Boswell 1984, Newman 2007, Orme 2001). Oblation did not consist solely of religious training, nor did this destine the oblate to a life as clergy. Oblates could be taught the skills for domestic service, cooking, farming and husbandry, hide tanning and vellum preparation, cloth production, and other such skills (Newman 2007, 2001, Orme 2001, Pounds 2014). Convents were particularly good places to teach noble girls to read and write (Livingstone 1999:12). This skill was important to estate management, which was the purview of noble women.

Individuals who did stay on as clergy held the opportunity for a high status in society, whether male or female. Nuns, for example, were educated, well fed, could travel the world, act as healers, found their own cloisters and schools, dress in finery, keep pets, and hold high ranking positions as abbesses and canonesses (Kenny 2007, Oliva 1998, Wemple 1981). A peasant girl could gain considerable societal status by becoming a nun.

2.7 The Spirit and the Body

Although views are changing, traditional Descartian western thinking holds that the body, mind, and spirit are separate entities (Nagel 1998, Scheper–Hughes and Lock 1987). In the early mediaeval North, however, there is much to suggest that the physiological and the phenomenological were not so easily divided. Healers, wise-folk, and the clergy were the primary consultants for *all* matters affliction (Kieckhefer 1990, Kvideland and Sehmsdorf 1991). An individual was as likely to go to a healer for a love potion as a wound poultice. Abortion was taboo; however, Saint Ciarán aborted a child of rape by making the sign of the cross and pressing down on the mother’s womb (Callan 2012). This act was miracle, not *malficium*.

The Church, specifically, was a proponent of healing the body as a catalyst for healing the soul (Binski 1996: 30). Much of what is known about the life of children, for example, comes as augmentation to miracle hagiography. Water seems to be a primary hazard to children in the mediaeval period (Gordon 1991), as it was when young Tommy fell into the Medway and drowned; however, prayers to Thomas the Martyr revived the child.

Monks were required to learn medicine along with scripture (Kieckhefer 1990: 57, Siraisi 1990: 1-16). Christian hagiography, especially, appreciated the infirm as an opportunity to illustrate the power of God through healing miracles (Finucane 2000, Gordon 1991). Saints Cosmas and Damian, for example, were known for their medical miracles (Metzler 2006). How much was miracle and how much was skilled medical knowledge is unknown. However, their cult spread at least as far as the Rhineland and there is a church dedicated to them in Wiltshire, England (The Church of England 2010).

Literature from the period attests to church sites becoming places of pilgrimage and hospice, especially with the growth of the Cult of Saints (Harvey 1993, Petts 2011, Schulenburg 2008, Talbot 2002). Excavations at pilgrimage sites have provided evidence of a high rate of disease and medical conditions. For example, Saint Adrian’s on the Isle of May, Scotland, has revealed 56 individuals with fractures, soft tissue trauma, and sharp force trauma. The rate of infection, both specific and non-specific, was 33.9% (James and Yeoman 2008). At Magdeburg in Germany, discovery of a secondarily deposited charnel pit revealed 75-150 individuals (Ricci 2010). As the remains were fragmented and co-mingled, prevalence rates were not determined; however, there was evidence of leprosy, tuberculosis, childhood stress, and non-specific infections.

Particularly the domain of women, midwifery included charms and potions working in tandem with what is now understood as medical knowledge to insure a healthy pregnancy and birth (Daniell 2005, Green 2000, Sanburn 2003, Weston 1995). For the Christian, midwives had the added ability to baptise a newborn should a Church official be unavailable (Maslanka 2012).

Being Christian, however, did not necessarily change the basis of ‘magic’. From a modern perspective, most mediaeval healing practices appear in the realm of magic. To the mediaeval individual, these practices were concrete, not abstract matters. To the early mediaeval Church, the important issue was where the power was coming from, not whether the power was real or not (Kieckhefer 1990, Siraisi 1990).

For instance, an individual who failed in love went to a woman who was skilled in love-magic (Bitel 1996, Borsje 2012, Wemple 1981). Her skills included curing or causing impotence, or making someone fall in or out of love (Borsje 2012, Rider 2006). Haraldr hárfagri was put under a love spell by the pagan Snæfíðr in Heimskringla (Sturlason 1844). However, the revered Saint Brigid *also* blessed water for a man which made his wife fall madly in love with him (Borsje 2012).

The dualist separation of medicine and magic did not come in to being until much later in the middle ages. Additionally, while love-magic and midwifery were female occupations, the concept of 'witchcraft' being the domain of women did not take firm hold until the 16th century (Bever 1982, Wiesner 2000). There is even speculation that all elves, Anglo-Saxon mischief makers, were male; and it is later, as magic became associated with women—especially evil doing women—that elves gained a female nature (Hall 2004).

Both the Norse sagas and the Irish penitentialists give the impression that magic was the domain of women (Bitel 2002, 1996, Jesch 1991, Price 2002). Although thought to be based on earlier oral stories and concepts, most of the sagas were not recorded until the 13th century and the surviving penitentialists are also from this date or later (Hermann 2010, Kristinsson 2003). This later, more Christianised, saga literature—as with the Galenist Irish documents—may potentially illustrate a biased view of 'witchcraft' and women in the early mediaeval North.

In fact, Frankish and Anglo-Saxon law codes seem to treat men and women equally in respect to magic use (Harper Dunn 2006, Wemple 1981). Additionally the Norse god *Óðinn* (Anglo-Saxon god *Woden*) was himself a practitioner of spells. Recent work in the cross-cultural archaeology of shamanism has actually suggested that many of these healers were treated as if they were a third gender (Knüsel and Ripley 2000, Price 2002, 2001).

There are also many early mediaeval words that today are translated as ‘witch’; yet did not originally hold that meaning. One of the commonly used Old English words is *hægtessan* (Hall 2004, Harper 2013), a predecessor to the modern word ‘hag’. The root meaning, however, is that of a knowledgeable woman with healing powers. In Old Irish, some of the words are: *clàrsach-ùrlar*, meaning harp foundation (a bard or skald); *beanuibe*, spell woman; or *cailleach*, which is used for old women, witches and nuns interchangeably (Dwelly 1911, King *et al* 2009).

One main component of being a magic-wielder was the wearing of a special belt or coat with item-carrying straps handing from it (Price 2002, 2001). The exact construction of this belt varied by culture and by individual; however, one of the basic formations involved a fringe, of sorts, that would hang down the wearer’s legs. A reconstructed grave from Ust’-Uda, Irkutsk, Siberia revealed a coat which was fringed about the waist (Devlet 2001). In a late example, a woman tries to tempt Sir Gawain with her ringed green girdle in the well known Arthurian romance (Tolkien *et al* 1967). In addition, one of the Irish words for ‘witch’ is *briosaid*, or belt wearer (Dwelly 1911).

Staffs and cauldrons are also common tools of the shaman (Price 2002, 2001). An additional female found in the multiple boat burial at Bikjholberget was interred with a dog, horse riding equipment, cauldron, roasting spit, and a staff (Moen 2010)[3]. Along with the heavily furnished ship burial, two staffs and a cauldron were also discovered in Norway in the Oseberg mound (Ruffoni 2011). A maple staff was the only grave furnishing discovered at Hedeby, Denmark (Eisenschmidt 2011).

Staffs themselves took on Christian symbolism during the mediaeval period. Crosiers became part of the trappings of the Church hierarchy, and these are just one of the furnishings found in the burials of Church officials

3 She was also given an egg-shaped stone. See Chapter 3 for similar grave deposits in Estonian graves.

(Daniell 2005, Hallad 1982, Mägi 2004). Additionally, during the increasing popularity of pilgrimage, pilgrims' staffs became a part of the persona of the pilgrim (Daniell 2005: 165, Rivard 2001). Staffs were also a symbol of the verger; though, in the early mediaeval period this position may have been more of a practical, "crowd-control" nature than a spiritual one (Harvey 1993). Working mainly in Scandinavia, Jónsson (2007) has also determined a correlation between burial rods and the protection of the living from disease.

2.8 Conclusion

The discussion of identity in this chapter was not meant to be an in-depth examination of all possible identity constructs across the early mediaeval North. Instead, an overview of the life course was given from birth to old age, citing examples which supplied an over-all impression of identity relative to the research area. The role of honour and purpose was presented as a fundamental component of the construction and practice of that identity. This information was chosen as pertinent to the wider purpose of this thesis: identity in early mediaeval Scotland. The next chapter considers burial as a part of the practice of identity in the North.

CHAPTER 3

Burial in the Early Medieval North

3.1 Mortuary Theory: Fact, Fiction, and Complications

The link between identity and what happens to the body after death is a complex system. Graves have been described as containing more information per cubic metre than other archaeological feature (Crass 2001, Peebles 1977: 124). The antiquarian interest in ‘curiosities’ lead to the investigation of graves in order to find the ‘treasures’ within (Brown 1980, Wawn 2002). This is not to imply that all early mortuary ‘archaeology’ was merely treasure hunting; only that it was the grave goods which drove the investigations, especially items such as jewellery or weaponry. As a result, information on context can be minimal to non-existent.

Many researchers still assume that there is a direct correlation between the grave environment and the individual in said grave and that mortuary practices are a direct mirror of the society in which they are enacted (Huntington and Metcalf 1991, Lohof *et al* 1994, Rakita and Buikstra 2005). However, funerary ritual, as with all ritual, is only a part of the whole that constitutes identity. Although mortuary rites can and are used to proclaim, appropriate, and negotiate identity, this is not always be the case (Cannon 2005, Insoll 2004, Pollock 2011, Rakita and Buikstra 2005, Tarlow 2011). Body disposal occurs in a multitude of ways and for a multitude of reasons, not the least of which is practical: coping with the mess and odour of decomposition. There are societal and cultural rules that dictate the proper way to deal with the dead, as well as family traditions, cadre rules, and personal preference of the deceased. All these factors play a role in mortuary ritual and not always in equal ways.

Mortuary rituals are generally thought to be performed by and for the sake of the living (Parker Pearson 1993, Rakita and Buikstra 2005). This has led to theories which give little to no standing to those who have died or those who are yet to come (Knüsel 2006, Parker Pearson 1999). Dying, and the rituals surrounding death, can be (and often are) very personal for the moribund. Funerary rituals often begin prior to the physical state of death and the dying can and do make requests on how those rituals come to pass (Lohof *et al* 1994). In addition, individuals in the future often interact with the burial site and this interaction shapes both their personal and social identities (Carruthers 1990, Williams 2006, Williams and Sayer 2009).

3.1.1 Burial, Belief and Religion

Belief systems have traditionally been treated as a direct and causal link to burial form (Halsall 2011, 1995, Insoll 2004). In Northern Europe this has especially been the case with, and particularly important to, the interpretation of the spread of Christianity (Hoggett 2007, Maldonado Ramírez 2011a, 2011b, Petts 2011, 2000). This simplification of identity expression has created a paradigm of 'Christian Burial' against which all other burial forms are compared. In early mediaeval Scotland, this paradigm normally includes:

1) A general east-west alignment of the grave and the individual within.
2) A corpse placed in a supine and extended position.
3) The grave itself, whether plain earthen or designed to hold an enclosure (ie, coffin or cist), being only large enough to accommodate said body and any enclosure. This would result in a long, relatively narrow hole dug into the ground. Therefore, grave structures such as short cists, chambers, or boats would

not fit the paradigm.

4) Little to no grave goods with ‘none’ being the preferred status. If goods exist, they should be recognisable as ‘Christian’ (crosses, patens, chalices, and so forth)

If the mortuary deposition generally fits the above paradigm, the burial is deemed Christian.[1] Henshall (1956), for example, argued that the long cist cemetery at Parkburn, Lasswade, Midlothian was Christian based on the east-west orientation of the graves and the lack of grave goods. She further suggested that there may have been an undiscovered church on site.

If the deposition does not fit the paradigm, the burial is supposed as pagan (or ‘deviant’). For instance, the individual discovered at Adwick-le-Street, Yorkshire:

> ‘has proved to be the burial of a mature woman, in her forties at least, dressed in a Scandinavian strap-dress and apron, fastened by late 9th-century oval brooches. She was accompanied by a bronze bowl, a knife and a key/latchlifter, all of which are indicators of a pagan Viking woman’s burial (Speed and Walton Rogers 2004: 84)’.

All this has been ‘proved’, despite having no osteologically diagnostic features; despite the individual having been placed supine, extended, and generally east-west aligned; and with no reference as to how these items establish the paganess of said individual.

Offering Christianity (aka the Church) as catalyst for change in mortuary

1 In commenting on this to a colleague at a conference, I was immediately met with the response ‘But what else would it be?’

form implies that burial is not only directly related to religion, it is inseparable from it (Fahlander and Oestigaard 2008, Huntington and Metcalf 1991, Insoll 2004, Parker Pearson 1999). This also lends to circular reasoning (a self-fulfilling prophesy, if you will) with Christianity as the culmination of the lifecourse. While religion can certainly be an instigator of change, it is by no means always a catalyst, nor is it always the sole motivation behind change. Sometimes religion is even the scapegoat. Christianity is, in particular, the catalyst traditionally offered for most change in early mediaeval Europe; however, this not only minimalises the role of other, non-Christian belief systems, it also ignores the variety of belief systems within Christianity itself (Petts 2011, 2000).

For burial form in particular, this explanation is further complicated by the fact that the Church shows no interest in mortuary rites until at least the 9th century (Fry 1999, Petts 2011, 2000, Sparey-Green 2003, Thompson 2004). Augustine, for example, believed that funerary rituals were unnecessary for the dead (*De Civitate Dei* 1.13). Hincmar (1990) commented in the 9th century *Collectio de Ecclesiis et Capellis* that a church and its grounds were a physical expression of the Christian community; the implication being that non-Christians should not be buried there; however, no additional specifications for burial were given.

Actual rites for consecrating the grounds were not mentioned until the 10th century *Pontificale Romanum* (Benedicto XIV and Leone XIII 2014); although the true need for this consecration was still in question into the 12th century: Honorius Agustodunensis, for example, saw no reason to bury Christians in a churchyard (2006a, 2006b). Additionally, when specifications were finally given for 'proper' Christian burial, these concern the *place* of said burial; ie: churchyard or no, county of birth or no, and so forth. There was no specification as to *manner* of burial.

Some Church fathers did condemn cremation: Henricus de Lettis in the 12th century, for example; however, in 1214/15 Pope Innocent III supported cremation as a traditional burial rite (Kurisoo and Jonuks 2013). Therefore, if the Church itself was not specifying (or agreeing upon) burial rites, a causal connection cannot be made between the accepted paradigm of the 'Christian' burial and *actual* Christian burial. It, therefore, follows that any determination of 'paganess' should be taken with great care.

3.1.2 Grave Goods, Spatial Relations, and Other 'Markers' of Identity

As alluded to above, the grave environment has traditionally been used in an uncritical way to establish meaning from the grave: gender (and sex), social status, age, ethnicity, family 'groups', religion and so forth (Arnold and Wicker 2001; Gowland and Knüsel 2006a; Halsall 2011; Petts 2011). Despite increased criticism, components of this archetype still permeate analyses of funerary ritual forms (Delaney and Roycroft 2003, Grundberg *et al* 2000, O'Connell and Clark 2009). Pollock (2011: 31), for example, states that until recently Near Eastern archaeologists tended to ignore human remains in favour of the physical tombs and articles within. The complication here is symbolised by the bowl mentioned in Section 2.1. If, say, ten people own a version of the same bowl; say even purchased at the same store from the same lot from the same manufacturer; there is no guarantee that these people will use these bowls for the same ten uses. Therefore, the meanings seen by researchers may not be the same as those meant by mourners; nor by the deceased him(her)self; nor by one person to another. Although applied to ethnicity, Lucy (2005b) and Chapter 6 of Jones (1997) have a good assessment which can readily be applied to other identity constructs.

In her chapter on Christian burial in early mediaeval Ireland, Scott (2011) chastises mortuary archaeologists for giving a cursory nod to religion in burial form and then focusing on the outdated Saxe-Binford approach to find meaning. The burials she studied on Omey Island were generally unvaried, in the Christian paradigm at an ecclesiastical site. Using the Saxe-Binford approach would suggest a highly egalitarian society. However, Scott states that, according to historical texts and settlement archaeology, early mediaeval Irish society was highly stratified, disproving the egalitarian conclusion (Scott 2011: 66-71). She suggests that the Omey burials were generally homogeneous due to the Christian faith of the early mediaeval Irish.

3.2 Mortuary Form: Trends in Burial in the Early Mediaeval North

By the 8th century, furnished burial had essentially vanished from continental burial forms in western Europe (Halsall 1995). Though a decided generalisation, most burials were inhumations placed in the supine position, aligned generally east-west, with little to no grave goods. Cemeteries had also begun to dominate, rather than isolated or small burial groups (Halsall 2011, 1995, Maldonado Ramírez 2011a, 2011b). This burial form had also become predominant in Ireland and Southern Britain during the 5th and 6th centuries (Carver 2003, Fry 1999). In fact, in Ireland, 'Christian-style' burial was the norm long before the traditionally believed acceptance of Christianity in the 5th century (Scott 2011). The *Táin* suggests that the dead were buried where they died; therefore, it has been the practice of researchers to identify a lone (or very small cluster of) grave(s) as pagan, merely due to the lack of a larger cemetery structure (Fry 1999).

This move towards cemeteries has been associated by researchers with the presence of an ecclesiastical building, usually a church; specifically with the implication that the church was the instigator for the cemetery (Buckberry 2007, Lucy and Reynolds 2002, Petts 2011, Sayer 2013, Schüke 1999). However, recent studies have not borne out this conclusion. At the 10th century St. Peter's, Barton-upon-Humber, England for instance, at least 25 graves were relocated in advance of the construction of the first church on the site (Rodwell and Rodwell 1982). Additionally, at Tournedos 'Portejoie', Normandy, France, during the 7th century, three cemetery groups were placed in conjunction with a Neolithic barrow and a shrine (Loveluck 2013, Zadora-Rio 2003). Then, during the 8th Century, a rectangular building was erected which has been interpreted as a chapel; although, it is only the larger, 10th century structure which has the recognisable structure of nave, chancel and apse. At Church Island, Kerry, Ireland, the 12th century church was built directly over 33 burials (O'Kelly 1957, Sheehan *et al* 2013).

In addition to the shift to cemeteries, the depositional environment became biased towards supine inhumation with an east-west alignment and little to no grave furnishings. However, considerable variation did exist. Grave alignment was generally east-west, but many were placed obliquely off axis; such as the cemetery at Carrowkeel, Galway, Ireland in which 132 burials spanning the 7th to 15th centuries were aligned south-west to north-east (Wilkins and Lalonde 2008). At Kirkdale, North York Moors, England, the late Anglo-Saxon burials were aligned north-west to south-east, while the Norman period graves were aligned east-west (Buckberry 2004, Rahtz and Watts 1997). Additionally, during the late Estonian Iron Age (11th-13th centuries), 'literally every single direction' was used to orient inhumation graves (Kurisoo and Jonuks 2013: 80, Lõhmus *et al* 2011). Cremation was still in use in Scandinavia and Eastern Europe; however, by the end of the period, late 12th century, inhumation burial and the cemetery were generally ubiquitous.

Some interments during the period were placed into a simple earthen grave; others were enclosed in a variety of containers: cists or plank built coffins (Gräslund and Müller-Wille 1992), hollowed-out logs, chests made of wood (mostly in Northern England during the Middle Saxon period: see

Craig-Atkins 2012 for a summary), baskets or thatch (Fry 1999) and reused boats. These 'enclosures' need not be complete. Cist structures could have four walls, floor, and lid; or there could be no lid, no floor, or as little as one wall. Small rectangular stone-made structures surrounding the cranium, often referred to as head-boxes, have also been discovered alone and in conjunction with other enclosure structures. Graves at Knockea, Limerick, Ireland, for example, had a stone lining only around the head (O'Kelly 1967). Similar head propping stones, sometimes referred to as 'pillow' or 'earmuff' stones, are also not uncommon in lieu of the head-box.

Body positions were generally supine (Halsall 1995, Zadora-Rio 2003). Some individuals appear to have been tightly bound as if wrapped in a shroud or other binding (Fry 1999, Hadley 2000). Some of these burials are also associated with pins—presumed to be shroud pins; although many such graves do not include pins (Daniell 2005, Fry 1999, Halsall 1995). This could be the result of the pin decaying, such as the possible copper pins evidenced by green staining at St. Andrews, Fishergate, England (Addyman and Black 1996). This could also suggest that the shroud (if one existed) was stitched and not pinned.

Other interments do not seem so restricted; such as at Llandough, Glamorgan, Wales, where the variety in limb positioning suggests that many of the individuals were placed unconfined into their graves (Holbrook and Thomas 2005). The 10th century *Regularis concordia* prescribed that the corpse of every monk be washed and dressed in a clean shirt, cowl, stockings and shoes (Symonds 2013); thus, there is no reason to suppose that tight shroud-binding was necessary to the mortuary process.

Irish sources suggest that individuals were wrapped in foliage such as fronds or straw (Fry 1999). The early 10th century poem *Cell Chorbbáin* states that in death, Corbbáin rests under branches in the church (Gwynn *et al* 2014). The *Lebar na Núachongbála* (or Book of Leinster) refers to the *strophaiss*, OI broom cloak, which is meant to cover the body for burial (O'Sullivan *et al* 2014, Fry 1999). Excavations at Hulton Abbey in Staffordshire revealed one inhumation with small remains of what appeared to be rushes (Klemperer 1992). Further soil analysis of the site revealed the '*outstanding* and *anomalous* presence of rushes' (Klemperer *et al* 2004, ital added). The Finno-Ugaric peoples of northern Scandinavia and Russia still used birch bark as shroud 'swaddling' well into the 20th century (Balzer 1980, Kleppe 2012).

3.2.1 Grave Goods and 'Elaborate' Burial Forms

At the beginning of the late 8th century, grave goods are found sparingly in Germanic archaeological contexts (Halsall 1995). Some of the most common inclusions are quartz pebbles, charcoal, coins, and pins. During the 7th and 8th centuries, graves in Denmark and Sweden begin to increase in complexity, while those in Norway become more simple (Halsall 1995). It is during this period that elaborate ship burals at Valsgärde and Vendel are created (Crumlin-Pedersen 1999, Halsall 1995). In the 9th and 10th centuries, the more elaborate burial forms permeate into Norway with sites such as Kaupang, Oseberg, and Gokstad (Crumlin-Pedersen 1999). Chamber graves are also a not uncommon burial form in Scandinavia at this time; the most notable collection existing at Birka, on the Isle of Björkö, in Sweden during the 9th and 10th centuries (Gräslund 1981, Price 2002, Ringstedt 1997).

When grave goods were included in Scandinavian and Eastern European burial forms, these could include weaponry; such as: spears, swords, shields, and bow and arrow sets. This type of 'warrior' equipment has traditionally been seen as a male gendered burial suite, and the sex of many individuals has been determined via grave goods alone, without the use of osteology

(Crumlin-Pedersen 1999, Jesch 1991, Ljungkvist 2008). The traditional 'female' gendered suite; including items such as: spindle whorls or other weaving implements, oval brooches, more than one bead, and keys, has also been used to determine a female sex of the individual in a given grave.

In more recent years, skeletally female individuals have been identified as buried with 'male' grave goods. At both Gerdrup and Bogøvei, Denmark, one female skeleton at each site was buried with a spear (Gardeła 2011). Additionally, skeletally male individuals have been discovered with 'female' goods; such as the male at Vivallen in Härjedalen, Sweden who was equipped with silver and bronze ornaments and his clothing was decorated with silver bands (Werbart 2006, Zachrisson 2008). Gender identity can be complicated and fluid. Therefore, any designation of gender to individuals without a critical analysis of human remains should be cautiously accepted (Arnold and Wicker 2001, Crass 2001, Rautman 2000, Sofaer 2006b).

Although furnished burial in Scandinavia is legendary in nature, especially the more elaborate ship and chamber burials, most Scandinavian burial forms mirrored that of the rest of Europe in terms of furnishings. A large portion of the Scandinavian burials hold little to no grave goods (Eisenschmidt 2011, Gräslund and Müller-Wille 1992, Myhre 1998). The 8th and 10th century cemetery complex at Hedeby on the Germano-Danish border, for example, holds an estimated 10,000 graves (Eisenschmidt 2011). Of the 1350 that have been excavated, only 13 were elaborately furnished. The remainder held very few or no grave goods at all.

By the 12th century, the inclusion of grave furnishings had returned to European funerary practice. Again, this is an over simplification; however, the growing wealth and prestige of both the upper classes and Church officials appears to have contributed to an increase in the elaborate nature of burial forms (Daniell 2005, Hallad 1982, Mägi 2004). Chalices, patens, rings, and crosiers are most commonly found in the graves of abbots, bishops, and other Church officials, reflecting the growing wealth. Edward I of England, for example, was reportedly buried with a crown, royal robes, and sceptre (Daniell 2005: 170).

Grave furnishings were also not limited to the elite. At Ridanæs, Gotland, Sweden, for example, a churchyard cemetery revealed 43 furnished graves of women and a few children (Carlsson 2009). These individuals had been interred with beads, brooches, and combs. One grave held a coin of Æthelred the Unready (ca 1000AD). In the Baltics, grave goods were commonly placed to the graves of peasants (Mägi 2004). In Estonia, even the more modestly furnished graves included jewellery, knives, and belts well into the 15th century.

3.2.2 Pageantry and Ceremony

Mortuary ritual in the early mediaeval period was about ceremony (Ariès 2008, Coss and Kee 2002, Daniell 2005, Fry 1999, Thompson 2004). In the 10th century, Ibn Fadlan (2012) describes the funeral of a Volga chief for which the creation of funeral attire alone takes ten days. The enormous ship burials at Oseberg and Gokstad are archaeological evidence of similar funerary rites (Gräslund and Müller-Wille 1992, Moen 2010, Ruffoni 2011).

The more archaeologically modest burial forms can easily promote the idea of a modest associated ritual (O'Sullivan 2013, Williams 2006). Although, in some instances this is probably true, it is important to remember that many objects in the past do not survive to the present; and therefore, grave forms that appear simple now, may merely appear as such because 'pomp-and-circumstances' have not been preserved (Janaway 1985, Petts 2011). It is also important to be mindful of the fact that not all complexities of ritual leave a physical trace (Carruthers 1990, Innes 1998, Williams 2006).

In Ireland, for example, the tradition of the wake (OI *tórramha*) still continues today (Donnelly 1999, Mooney 1888, Royal Irish Academy and Queens University Belfast 2013). In the early mediaeval period, female keeners would perform something between a wail and a song that would send the soul of the dead to the afterlife. The family would stay around the dying individual and recite prayers for a good death (Mooney 1888). There is also a great vigilance that must be taken to watch for 'unlucky occurrences' and perform the proper counter rituals if any should occur. For example, if a feather were to land on the bed or person who is dying, a hard death would occur and the person should immediately be placed on the floor (Mooney 1888). This wake could last up to a week or more for the average person; however, high status individuals could be given a 12 day waking (Fry 1999). It was important that the corpse never be alone. Families of similar social standing to the family of the deceased were required to send food and supplies (Fry 1999, Lysaght 2003). This method of waking the dead does not leave a substantial physical trace, but there is still a great investment and ceremony involved in the process.

With the growing power of the Frankish kings, the Frankish Church sought to consolidate the agglomeration of rituals in use throughout the empire (Paxton 1990). By the coronation of Charlemagne, the Gelasian Sacramentary was in place for the sick, dying, and dead (Wilson 1894). These included the proper prayers and order of prayers to say, the correct chants, proper anointing, and the timing and method of procession. The ceremony surrounding death could take 30-40 days (Paxton 1990).

Spreading from the Carolingian Empire, the funeral requiem became a common and popular custom. The funeral mass (performed once a day) would be said for the dead over the course of as many days as was needed or requested for penance (Binski 1996). A Gregorian requiem lasted 30 days.

In addition, a grand procession could take place with church officials in full regalia (McLaughlin 1994). By the high mediaeval period, the pageantry drew commoners from very far away in order to witness the display (Fry 1999, Gittings 1984). The Bayeux Tapestry depicts the funeral of Edward the Confessor. He is wrapped in a multi-coloured shroud, possibly decorated with gold or silver thread, and is being carried to Westminster Abbey on an ornate bier by eight porters and a trailing parade (Bibliotheca Augustana 1996).

3.3 Burial in Scotland: a Beginning

The Iron Age in Scotland is marked by a distinct absence of definable graves and tangible bodies (Armit and Ginn 2007, Maldonado Ramírez 2011a, 2011b, Shapland and Armit 2012, Tucker 2010). In other words, there is a noticeable lack of bodies in Scotland.

At the beginning of the early mediaeval period (also considered the late Scottish Iron Age), funeral deposition in Scotland had begun to move towards inhumation (Etheridge 1993, Maldonado Ramírez 2013, 2011a, 2011b, Tucker 2010).

Very early in the first millennium AD, plain earthen graves occur (Ritchie 2011). These appear sometimes in conjunction with cists or kerbed cairns (see below). They are normally single inhumations found alone or within several meters of up to two more graves. These graves are often discovered near the shoreline due to coastal erosion and years often pass between discovery of one grave and another. The graves are mostly unfurnished; however, occasionally a piece of associated jewellery or pottery is found. During the mid to late first millennium, graves are more often found in groups. These can be plain earthen graves or inside an enclosure. Metal and bone pins do occasionally manifest and these are normally interpreted as shroud pins (Morris 1989, Perry *et al* 2000, Thomas 1967).

At Galson, Lewis, Scotland, for example, two inhumations were discovered three years apart, 1993 and 1996, when coastal forces eroded a sand wall on the north end of the island (Neighbour and Knott 2000). The 1993 discovery proved to be a plain earthen grave of an adult male laying on his right side, head at the west and knees slightly flexed. A pot and a bone pin were was found near the skull, along with a corroded penannular iron brooch near his neck. Radiocarbon dates this individual to 110–410 AD, cal 2-σ[2] (Neighbour and Knott 2000, RCAHMS 2016). The grave discovered in 1996 also held an adult male. He had been placed in a cist which had been capped with flat stones, laying supine with knees slightly bent. No grave furnishings were discovered. Radiocarbon dates this individual 60–316 AD, cal 2-σ[3] (Neighbour and Knott 2000, RCAHMS 2016).

Earthen graves and cist inhumations of the above nature also appear in conjunction with kerbed cairns (also known as platform cairns and low cairns) (Ritchie 2011). Though not a true cairn, this burial form involves digging a pit in a geometric shape, usually a circle or a square; lining it with clean fill, often sand or shell; laying the individual in the centre and then layering more clean fill in until it is closely even with the surface level. The final, top layer, is pebble, which is lain flat. Lastly, the entire shape of the grave is outlined with larger stones, resembling a kerb (Ashmore 1980, Ritchie 2011).

Many of these early millennium inhumations have been thought to be isolated or very small mortuary groupings (Tucker 2010). However, reports of eroding cists and human remains exist for Galson as early as 1922, and a preliminary inspection of the data by the present author reveals at least 10 inhumations reported (Neighbour and Knott 2000, RCAHMS 2016). Thus, the potential exists for this type of funerary deposition to be more of a communal

2 Lab Code: GU-7400; Raw date: 1770±60 BP.

3 Lab Code: GU-7401; Raw date: 1850±50 BP.

than isolated rite.

Towards the middle of the millennium, cemeteries started to emerge as a more common burial tradition (Maldonado Ramírez 2011a, 2011b, Tucker 2010). A few of these cemeteries showed a number of kerbed cairns, such as Lundin Links, Fife; though it is difficult to ascertain the exact ratio with the given data (Greig and Greig 2000).

Short cist graves have been mainly understood as Bronze Age phenomena; however, radiocarbon dating has shown that short cists were still used through the Iron Age and into the early mediaeval period (Greig and Greig 2000, Small *et al* 1973, Thomas 1967). Long cist graves were generally considered pre-Christian and Iron Age by antiquarians; however, during the last 50+ years, long cist cemeteries were understood to be a very early mediaeval practice—generally dating to the 4th–7th centuries (Greig and Greig 2000, Henshall 1956). Radiocarbon dating has predominantly borne this out; however, sites such as Hallow Hill, Fife seem to be in use well into the 9th century (Proudfoot 1998, Proudfoot *et al* 1996).

Since the application of radiocarbon assays; long cist cemeteries have been viewed as a general indicator of the acceptance of Christianity (Etheridge 1993, Maldonado Ramírez 2013, 2011a, 2011b, Petts 2011, 2000). Columba is generally attributed with the spread of Christianity on mainland Scotland during the 6th century AD (Adamnan 1998); although, Ninian is said to have proselytised as early as the 4th or 5th century (Clancy 2001, Fraser 2002), fitting the time frame for the appearance and usage of the long cist cemetery. Long cist cemeteries tend to be laid out in the general east-west alignment with individuals placed generally supine and extended without evidence of grave goods, fitting the ‘accepted’ pattern of Christian burial given above.

During the 8th–10th centuries, cist usage decreased. It is unclear whether the earthen grave form increased, or more archaeologically unsound grave enclosures were chosen. For example, wooden coffins have traditionally been understood to be a high mediaeval or post-mediaeval practice; however, remnants of coffin wood and were discovered with graves at Kebister, Shetland which were radiocarbon dated to 880 to 1160 AD, cal 2-σ[4] (Owen and Lowe 1999, RCAHMS 2016).

As the end of the 13th century drew near, many burials became associated with ecclesiastical sites. Most of these sites have not been fully excavated, such as Kirkhill St. Mary's, St. Andrew or St. Mungos, Glasgow Cathedral; and in these cases, the portions that have been investigated date to the later mediaeval era (Driscoll 2002, Rains and Hall 1997). This has left a gap in the knowledge of how the burial environment changed as the high mediaeval period approached.

3.4 Variation or Deviation: When is Burial Form 'Normal'?

The overview of Scottish burial as given above is incomplete. This thesis attempts to increase our understanding of early mediaeval burial in Scotland. During this period, the people of Scotland come in contact with a broad range of cultural influences. In order to remain unbiased, it is necessary to examine the concept of normal variation vs atypical or deviant burial. What is deviant in one context may be normal in another. It is important not to impose a motivation on a burial form that may or may not have been intended at the time of the deposition. For example, burial depth has been cited as a possible source of disdain for the dead—or a lesser amount of care at minimum (Crawford 1999, Reynolds 2009). However, in Sámi burial tradition, a shallow burial is extremely important for the buried individual to be able to get out of the grave and travel to the world of the dead (Manker 1961).

4 Lab Code: GU-2332; Raw date: 1060±50 BP.

3.4.1 Animals

In Scandinavia, it is not uncommon to find animals included as a part of the burial deposit, either in articulated or mostly articulated form (Gräslund 2004, Jennbert 2003, Prurnmel 1992, Sikora 2003). Horses have been particularly noted in excavation reports, but also dogs and some birds (Jennbert 2003, Price 2002, Wallis 2001). This feature, along with the distinctive grave goods mentioned previously, the cremations, and the ship-burials, has traditionally been considered indicative of pagan beliefs and used to trace 'Viking' and 'pagan' influence across the North (Jennbert 2003, Petts 2011). The underlying assumption behind this pagan vs Christian hypothesis is, again, that pagans are buried with grave goods and Christians are not (Bazelmans 2002).

However, as previously stated, mortuary forms were not considered relevant to the Christian Church until the 12th century or later (Maldonado Ramírez 2011a, 2011b, Petts 2011, 2000, Thompson 2004). While certain animals were occasionally restricted from entering the cemetery—Wulfstan of York (1972), for example, bans dogs, horses and pigs from coming onto the grounds—burial with animals is not expressly forbidden. In 'Christianised' mediaeval Ireland, graves in which human and animal are within the same context are traditionally seen as 'deviant' by researchers (Fry 1999). A very common reference in defence of this stance is MacCarthaigh's Book, ca 1170, in which Donnchaid, father of Dairmait Mac Murchada, was buried with dog as sign of contempt (Färber *et al* 2010). There is little else in the *eom temporum* literature regarding the co-burial of animals and humans in one regard or another.

In fact, animals generally have a positive connotation in European history, including Ireland (Walker-Meikle 2012). Dogs were so important to the Irish aristocracy, that the boy hero, *Sétanta*, actually became the replacement for

Culann's dogs when *Sétanta* is forced to kill them in self-defence. He then took the name *Cú Chulainn*, IRE Hound of Culann (Carson 2008, Royal Irish Academy Queens Unversity Belfast 2013). The status of cattle was so important that cattle-raids were rampant in Ireland; inspiring some of Ireland's most loved and most famous stories, the *Táin Bó* collection: *Táin Bó Flidaise, Táin Bó Cúailnge, Táin Bó Regamain*.

Horses, especially strong and fast horses, were paramount for political power in the mediaeval North (Clark 2004, Effros 1997, Härke 2014). Horses were one of the most prestigious gifts to give and be given in the Merovingian and Carolingian empires (Curta 2006). The Welsh *Mabinogi* tells how *Pwyll* knew *Rhiannon* was the woman to marry because her horse was so fast that no other horse could catch it (Ford 1977); and, the Norse god *Óðinn*, is able to slip in and out of *Valhöll* on his swift, eight-legged horse *Sleipnir* (Sturluson 1997a, 1997b).

Christian literature also used animals as illustrative symbols. Christ is often depicted as a lamb, although more often this represents Saint John (Ferguson 1966, Sill 1975). Saint Mark is often shown as (or with) a lion, as in the Echternach Gospels (Stevick 1986) or Book of Durrow (Werner 1981). The dove is both the symbol of peace and a representation of the Spirit of God (Ferguson 1966, Sill 1975). Therefore, animals were generally considered of great worth in the early mediaeval North.

In some burial traditions, animal grave inclusions remained a part of the mortuary ritual into the early-modern era. In Russia and Estonia, decorated bird eggs have been occasionally discovered as a part of the grave assemblage (Kurisoo and Jonuks 2013, Mägi 2004). These are often interpreted as Christian symbols of rebirth (Kurisoo and Jonuks 2013, Lesiv 2007, Sermon 2008). In Oosterbeintum, Friesland, the Netherlands, a 7th to 11th century (human) inhumation cemetery was discovered which also included the inhumation graves of six male dogs and a stallion (Knoli *et al* 1996). At Bad Langensalza in early mediaeval Germany, horses were buried side by side with humans in west-east aligned earthen graves (Timpel 1977). A very late example is Ralph Neville, the Earl of Westmorland, (d. 1425) who was interred with his greyhound in the choir of his church (Walker-Meikle 2012).

In Irish archaeology, however, the traditional assumption is that most Irish burials do not include animal deposits, especially those considered Christian (Fry 1999). There are many sites at which the excavators have discovered animal bone in relation to the burials; however, fastidious stratigraphy was not recorded for many of these, and it is not known whether the animal remains were deliberate deposits or disarticulated inclusions from the grave fill (Seaver, pers comm). In mediaeval Ireland, no articulated animal burials, either whole or in part, are known to have a direct association with human graves; however, there are a few burials from the early Christian period (5th to 7th centuries) with deliberate inclusion of antler (The Discovery Programme and The Heritage Council 2010). For example, there is a single female at Ballygarraun West, County Galway, with a naturally shed red deer antler placed over her pelvis (Quinney 2007); a male with an antler tine next to his left hand at Collierstown, County Meath, along with a female with a portion of charred pig bone (O’Hara 2010); and a female from Farta, County Galway, with antler and pieces of horse bone (The Discovery Programme and The Heritage Council 2010).

3.4.2 Prone Burial

Similar to shallow burial, prone burial is often considered a deviant mortuary form (Arcini 2009, Reynolds 2009: 37). This interpretation, however, may not necessarily be the case. Prone burials are commonly associated with decapitation or missing limbs, and individuals who seem to have been weighed down with heavy stones (Gardeła 2011, Price 2008). In his thesis, Viberg (2012) found that prone burial occurred in Sweden regardless of biological sex or age. In Anglo-Saxon England, prone burials are also relatively evenly distributed across the two sexes (Reynolds 2009). Prone burials that appear in normative cemeteries range from poorly to well furnished. Provided grave goods can be used to indicate community status, this suggests that the societal situation of the individual in the grave was not a factor in the positioning of the body.

There are quite a number of post-mediaeval to modern theories concerning revenants and their connection to prone burial, and it is believed that these theories are rooted in mediaeval belief (Barber 1988, Bever 1982, Feilberg 1907, Gollner 2008, Simpson 2003). In Macedonia, for example, it is believed that vampires were buried face down so as to bite into the earth, presumably to further affix themselves into the ground (Вражиновски 1988). In Silesia, vampires were buried face down to protect the living from their gaze (Barber 1988); although, in Romania it was believed that the vampire would turn himself over in the grave to lay face down (Murgoci and Murgoci 2005). While the specific concept of ‘vampire’ was not necessarily a part of Northern mythology, revenants certainly were (Régis 1987, Simpson 2003, Strackerjan 2012), and it is possible there is a similar belief at work.

However, the motivation behind prone burial need not be quite so dire. The story of Diogenes and Alexander (both died 323 BC) was well known through the middle ages (Cary 1956). The story purports that Diogenes demanded to be buried face down because the world itself was to be turned upside down by the Macedonians. The concept of the ‘World Turned Upside Down’, or *Widdershins*, was a common theme in the mediaeval North (Bonser 1926, Faraday 1906, McKay 1928, Puhvel 1983). The 8th century Frankish

King Pippin is said to have been buried upside down as an act of final supplication to the Lord (Carnevale *et al* 2010, Reynolds 2009). This occurred *inside* the cathedral of Saint Denis. As a late example, members of the Nodier family in the villages around Besançon had themselves buried face down in protest of Louis XIV annexing the area in 1678 (Oliver 1964).

In her survey of prone burial, Arcini (2009) determined that, while prone burial is not common (~1% of inhumation burials surveyed), it is a global phenomenon. She concluded that prone burial was a universal and 'deep rooted' way to show disrespect for the dead. Whether this is a universal sign of disrespect remains to be seen; however, it does seem probable that burials placed in the prone position carried a message of significance to the person(s) who prepared the grave.

3.4.3 Secondary Deposition and Burial in Pieces

In the mediaeval period people travelled as merchants, as pilgrims, as landowners, and as warriors. If an individual were to die in a foreign land, or even a 'foreign' county, (s)he may have left testate instructions to be buried in a specific cemetery (Ariès 2008, Daniell 2005, Hanawalt 1986, O'Sullivan 2013). Many local parishes required that Christians be buried at the parish cemetery (Daniell 2005, Forrest 2010). Additionally, some Christians were concerned at being buried in unconsecrated ground and if death occurred very far from a Christianised area, such as during the Crusades, a great distance would be required to return the corpse to its final resting place (Weiss-Krejci 2010, 2005).

Decomposition of the body instigated a need to alter the corpse prior to transportation (Bertelli 1995, Weiss-Krejci 2005). Sometimes referred to as *mos teutonicus*, alteration could involve embalming or drying, usually with some level of evisceration. Alteration could also involve defleshing so that only the individual's bones were transported to the place of burial. Depending on the time and resources available for preparation, corpse alteration could involve a combination of the previously listed methods. Additionally, to aid in portability, disarticulation was a common practice. Evidence of this type of practice was discovered in an 11th century inhumation from France, where cut-marks indicated both a violent death and post-mortem evisceration (Mafart *et al* 2004). The graves of the Babenbergs (Austrian dynasty 976 to 1246) were opened in the late 18th century and surviving drawings of the monastery suggest that the historical accounts of the Babenbergs and *mos teutonicus* were accurate (Weiss-Krejci 2001).

Reburial was also not uncommon when an individual died and immediate interment in a preferred location was impractical or improbable. For example, the Sámi still dig 'summer graves' for individuals who die during the nomadic, reindeer season (Kleppe 2012, Ojala 2009). Once the season is over, the Sámi dig up the 'summer graves' and rebury the bodies in the 'final' location. In areas in which the soil freezes or becomes buried in snow, such as Birka in Sweden, quickly dug communal graves were used until the dead could be reburied in the spring (Gräslund 1980). In Finland and Estonia, whole cemetery sites exist which were meant only for temporary burial (Valk 1994). Saint Francis (d 1226) was buried temporarily in the Basilica of Saint George until his final resting place could be built (McMichaels 1997). In such cases, it is possible that decomposition would make anatomical articulation improbable for the reburied corpse.

3.5 Symbols of 'Vikingness' in Burial

Within the research disciplines which study early mediaeval Scotland, certain forms of burial are considered 'Norse', and often more specifically: Norwegian (Ritchie 1993, Graham-Campbell and Batey 1998, Crawford

1987). This consideration is given because these forms are not common in the 'native' archaeological record, they appear in Scotland generally at the time when it is believed 'Vikings' had contact with and(or) lived in Scotland, and these forms have general correlations in the 'Viking homelands'.

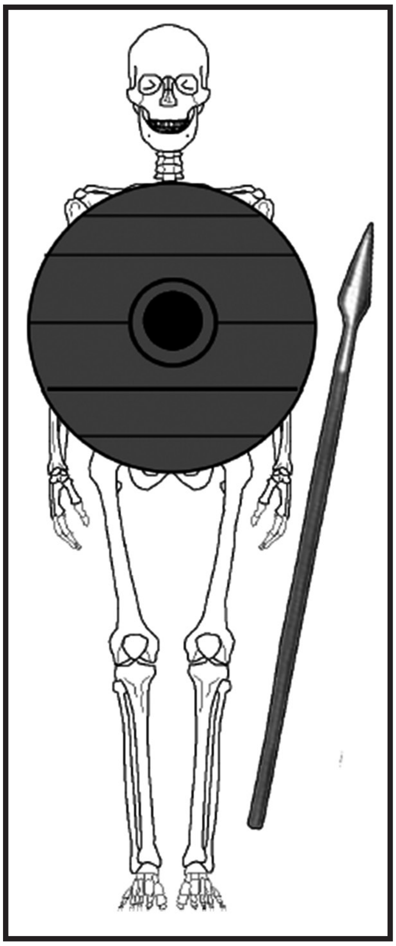

Figure 3.1, Basic Male Norse Burial (Author's Image).

The basic requirements for classifying a grave as Norse comprises the inclusion of a spear (or other weapon) and(or) a shield, for a 'male' grave, and most commonly both (Fg 3.1). Additional grave goods most commonly include further weapons, belt fittings, whetstone, arm and finger rings, combs, gaming pieces, blacksmith's tools, scales, buckets, bowls and drinking horns, and wooden chests.

In the case of a 'female' grave, the basic indicator is the inclusion of oval (or tortoise) brooches (Fg 3.2). Additional items commonly included are beads, usually glass or amber, hung either from the neck as a necklace or strung between the brooches, a weaving batten, linen smoother, spindle whorl, loom weight(s), keys, other

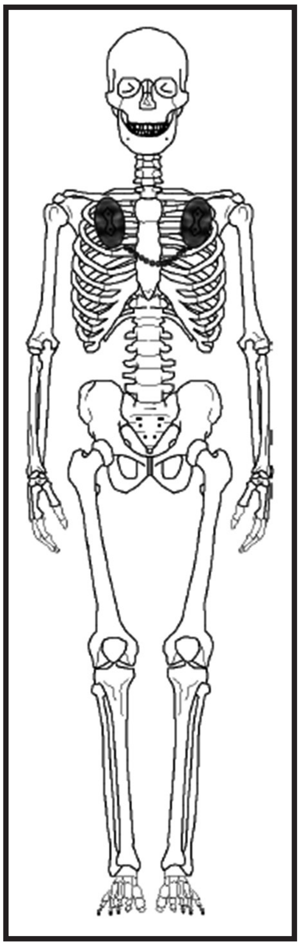

Figure 3.2, Basic Female Norse Burial (Author's Image).

brooch styles and pins, combs, wooden chests, buckets, Thor's hammers, and finger rings. Horses and dogs have also been included in Norse grave good assemblages of both sexes.

Superficially, the use of such criteria to determine the 'Norseness' of a grave is valid, particularly in light of the three justifications given above. However, a more critical inspection reveals some significant complications to this methodology. Firstly, this presupposes that there is such a thing as a 'Viking' (rather than a 'viking'—see Section 1.6.1), and conjunctively, that all 'Vikings' (aka 'Norse', aka 'Scandinavian', aka 'Dane', and so on)—and importantly: *only 'Vikings'*—were buried in this way.

For example, although the usage of grave goods had declined in England by the 7th to early 8th centuries; in Norfolk, some Anglo-Saxon women were still being buried the 'pagan' way (Williams 2010). These women were interred fully clothed with rings, brooches, necklaces, keys, knives, shears, and toilet sets. This is, at the minimum, approximately half a century from the first *known* viking raids. It is possible that the subsequent 'Viking' burials in England were extensions of the type of furnished burial seen in Norfolk. See Halsall's (2000) chapter on 'Viking' burial in England for a good critique of this argument.

In addition, during the early mediaeval period (late Iron Age and Viking Age in Scandinavian disciplines), burial forms in the so-called 'Viking homelands' vary considerably: across the geography, across time, and from individual to individual. In south-eastern Scandinavia, for example, Svanberg (2003) surveyed 306 sites ca 800-1100 AD[5]. He discovered that cemeteries not only varied by region, but also *within* regions (Fg 3.3). In Halland and north-west Scania the practice was mainly cremation

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5 Svanberg's thesis sets the date range at 800-1000 AD; however, many of the cemeteries have a terminus post quem of well into the 11th century.

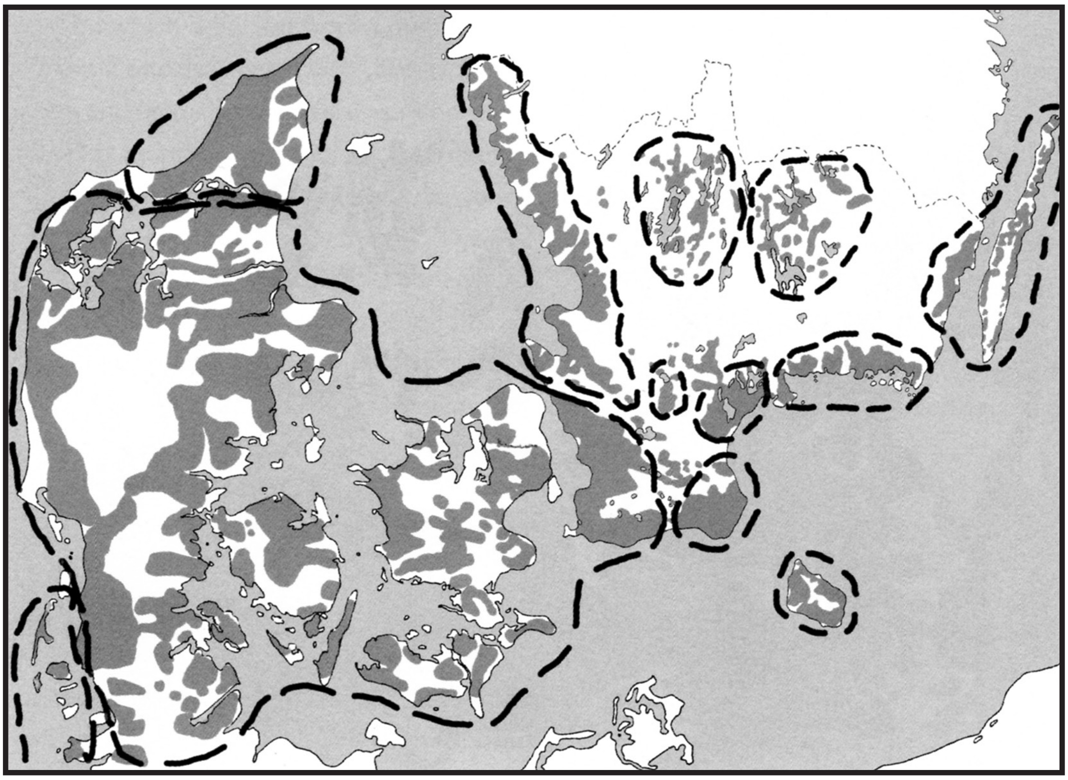


Figure 3.3, Zones of Burial Systems in South-East Scandinavia (Svanberg 2003: 148).

deposits, marked on the surface with oval or round stone demarcation or occasional mounds (Svanberg 2003: 142-3). Cremations were also the norm in Finnveden; however, surface marking patterns were the opposite of Halland: large mounds with only occasional round stone settings (Svanberg 2003: 143). In addition, angling hooks are particular to this area, along with a high number of arrow heads. In Öland and Möre there were four general burial forms: 1) cremations marked on the surface with rectangular stone settings, 2) inhumations aligned generally north-south and covered by small stone settings or small mounds, 3) 'aristocratic' burials richly furnished with elaborate surface markings, and 4) cist inhumations with an increase in ringed pins and the occurrence of weights and scales (Svanberg 2003: 144-5).

In the previously mentioned areas, burial with animals was common: mostly horse and dog; however, cow and pig were common in Möre. In south-west Scania inhumation was used almost exclusively, along with inclusions of human sacrifice, but animal inclusions were absent. (Svanberg 2003: 145). South-east Scania was almost exclusively cremation deposits with stone circles, ship shapes and a few mounds as surface markings. Svanberg (2003: 145-6) also found that north-east Scania could not be characterised as a homogeneous system. Svanberg's (2003) thesis can be accessed for a full detail of the variation at these sites. Note, this is just a small accounting of the variety in a relatively small portion of the 'Viking homelands'.

Furthermore, while the 'diagnostically Norse' burial forms stand in stark contrast to the 'native' Scottish, seeming therefore to prove the underlying hypothesis; such forms of burial are *also the exception in Scandinavia*, rather than the rule (Price 2002:91-232, Gräslund 1980, Crumlin Pedersen 2010, Williams *et al* 2010). In fact, simple dug or cist graves with little to no grave goods are far more common; just as they are in Scotland during the same period. The significance is that burial rites in these 'Viking homelands' are in no way homogeneous, nor are they always so different from the 'native Scottish'. Therefore, separating the native from the Norse may not be so simple as traditional researchers have often presumed.

3.6 Conclusion

This chapter has discussed mortuary theory and burial form in the early mediaeval North. This has included a discussion of the role of religion and burial and the general trend towards cemetery usage. Grave goods, grave enclosures, and body positions were considered, along with the pageantry and ceremony that surrounded the mortuary rite. A basic overview was given of the current understanding of burial in early mediaeval Scotland, followed by a discussion of divergence in the burial record. Finally, the customary criteria for determination of a 'Norse' grave in early mediaeval Scotland was examined. The next chapter will detail the body and its role in the creation of identity.

CHAPTER 4

Identity and the Body

4.1 Introduction

The Descartian theory that separates the tangible body from the (purported) intangible mind and spirit has been the underlying foundation of Western disciplines. However, it is now generally understood that the tangible and intangible are not only inseparable components of life, they are integral in the creation and action of identity (Gowland and Knüsel 2006b, Gowland and Thompson 2013, Scheper-Hughes and Lock 1987, Sofaer 2006b, Werbart 2006).

Being is an interaction between the body and the environment (Meskell 2000, Schutkowski 2008). Traditional archaeological and anthropological dialogues treat the biological aspect of this interaction as a relatively stable basis; around which other 'things' are made to conform (Gowland and Knüsel 2006a, Sofaer 2006b). While this methodology does not necessarily assume the body is immutable, it does presuppose that the *physical* body exists somehow separate from the *experience* of life.

The body is the mode of engaging with the world. The body is the 'thing' by which other 'things' are experienced, altered, built, destroyed, and adapted (Jenkins 1998, Laz 2003, Parker Pearson 1999). This is all processed through the brain—an *inseparable* part of the body. How people understand existence is vital to the process of identity.

Traditionally, the skeleton has been analogous to a coat hanger with the soft tissue commensurate with the coat: ligamentous and tendonous attachments acting like 'clips' to keep the 'coat' from sliding off the 'hanger' and onto the floor. This is, however, not the case. The body is plastic. It adapts to the circumstances in which it finds itself. In fact, plasticity begins even prior to fertilisation and it is essential for normal development (Pritchard 1995). Additionally, the body itself is adapted, destroyed, built, altered, and even experienced by other living things: other bodies. Bodies, therefore, are the key to the infrastructure of identity.

In anthropological and archaeological studies, most of the bodies under investigation are no longer living. After death, taphonomic processes take over the once living tissue, often leaving only the skeleton available for analysis; sometimes even less. However, every part of the body holds information which was deposited in life; therefore, any part that remains has the potential to impart knowledge about the being that once incorporated those remains into their identity.

Much of the ongoing research concerning the body and identity uses in vivo, clinical data as well as ethnographic information relatively modern societies. This chapter will give a broad overview of the body and its role in the composition of identity using a mixture of clinical, ethnographic and archaeological material. The core concepts will used in conjunction with archaeological and historical data to extract information about early mediaeval Scotland in later chapters.

4.2 The Body as Object

In Western conceptualisation we are used to viewing people as something other than objects. Objects are to be created and used by us; Therefore, we are not objects. Even the word is a negative when used as a human descriptor. We ‘objectify’ a person, and this is a bad thing. This is not to imply that abasement of a human being is a *good* thing. This is only to suggest that an object, in and of itself, is not inherently bad; therefore, objectifying the body; ie: understanding the body as an object, is also not necessarily a bad thing.

A bowl, for example, is an object often used in archaeology to help ascertain identity in the past. As much as any given bowl can be deconstructed into clay or soapstone, analysed for toolmarks, and evaluated on style to tease out information about the people who created and used it; a body is that and more. Whether mummified of skeletonised, a body is the physical remains of the actual person in question. The most direct and tangible link to a once living being is their biological remains (Gowland and Knüsel 2006a, 2006b, Larsen 2002, Lorentz 2008, Sofaer 2006b).

A body begins as an egg and a sperm. Though technically only building blocks at this stage, the state of these gametes will affect the merger of these two cells (Brewer *et al* 2011, Gluckman *et al* 2008). The biological makeup of the host immediately affects the process of implantation and the development of the morula to blastula to embryo and so forth. Improper implantation can result in limited space for the body to grow or a limited access to nutrients. Disease, parasites, poor nutrition, and chemical intake of the host can result in developmental interference to the foetus. Structural makeup of the womb will also affect development, as will certain disorders and medical conditions of the host. Every 'thing' can has an impact (good, bad, or neutral) on this developing body.

Yet, it is not the new body alone that is affected (Brewer *et al* 2011; Hamilton-Fairley 2004). The host body is being stretched, shifted, and eventually kicked from the inside. Weight is gained and sometimes lost. Nausea and regurgitation occur during many pregnancies. Cravings, allergies, and gestational diabetes are possibilities. Hormones surge and a feeling of euphoria or an increase in libido are common. One body cannot exist without affecting another.

Bodies develop from morula to adult, growing in size and changing in shape. The body ages: losing skin and joint elasticity, ease of mobility, height, bone density, and, for some, mental acuity. Hair grows and, in some, falls out. Females begin life unable to reproduce; then gain the ability only to lose it again. Bodies are altered by daily activities: exercise (or lack thereof), food type and amount consumed, clothing fashions (such as corseting or narrow shoes), plastic surgery, tattooing, and so forth. The body is both a framework for and a repository of identity. Biological tissues hold a relatively prescribed range of responses to stimuli (Lovejoy *et al* 2003). Because of this, the aetiology and ontology of those responses can be assessed and extrapolated.

The role of the body in identity is not complete, even upon death (Gowland and Knüsel 2006a). The moribund often place stipulations on what is to be done with their body when deceased. Other bodies come to perform mortuary rites using the body of the deceased. Even long after death a grave, cinerary urn, or other such item often acts as a memorial to the deceased body or simply to death in general.

The body is an object, and just like a bowl, it is created, crafted, utilised, worn down, broken and discarded. Just as information can be gleaned from the location in which the bowl is found, from the food residues, the chemical makeup of its components can tell where it came from (or started life), a body can be deconstructed to lend the same information.

4.3 Age and the Passing of Time

Human beings age within identity contexts (Morgan and Kunkel 2001). Age, as viewed in the modern West, is strongly linked to the context of chronology. However, age, as seen in other identity structures, may have little to do with the passing of time. The way age is viewed and is incorporated into any given identity is variable across cultures and among individuals. For example, for the traditional Anishinaabe of North America the chronological passing of time is not important (Jenness 1935, McNally 2009). Beard growth, the onset of menses, the ability to recite the tribal lore or the ability to properly beat a drum act as the indicators of ‘age’; not the number of years since birth. Most traditional Anishinaabe do not know their ‘age’ (as in years) and will give their age as ‘elder’ or ‘not yet a man’ or use other such terminology.

To the Swedish Sámi, the passage of time is important; however, it is not measured or understood as a consistent, linear path (Bergman 2006, Kleppe 2012). The beginning and ending of any period of time is marked by a concrete event, not simply the movement of the clock. Biehtsemánno, for example, is the pine interval (Bergman 2006). Biehtsemánno roughly corresponds to June or July; however, this is the time when the pine sap flows, and it begins when the flowing begins and ends when the sap flow ceases. Thus the length and timing of the pine ‘month’ changes every season. To the Sámi people, the age of any thing or any person is relative to the experiences that have occurred (Anderson 1984, Kleppe 2012).

One’s age, no matter how it is understood, can and often does affect the course of a person’s identity. A two year old will probably be treated differently than a 50 year old, and both will probably view the world differently from one another. A similar sentiment can be made for a child who cannot yet walk and an individual with grey hair and wrinkled skin, regardless of chronological age. This does not mean, however, that childhood, adulthood, old age, or any other ‘age’ of life would be recognisable to the modern person looking at the life of an individual in the past. These concepts are characterized particularly in relation to the identity to which they are attached (see Lucy 2005a for a deconstruction of this concept).

One’s age can and regularly does influence the shape a body takes at any given time in the life course. For example, Molnar (2011, 2008) found that certain dental wear frequencies decreased with age in her Neolithic population. This was attributed to an increased skill with the tool and therefore less movement of the tool and less scratching of the enamel. However, it is also that, socially, this activity was considered a job more for the young. Thus, the older one became, the less one would be performing this activity and the fewer scratches would occur.

For people from ca 900-1500AD South America, the cranial modifications associated with head-binding were performed within the first months (sometimes the first day) following birth (Duncan 2005, Duncan and Hofling 2011, Torres-Rouff 2005). These individuals were highly susceptible to injury, evil winds, and essentially losing their souls until specific rites were performed, including the binding of their heads to begin the process of cranial shape alteration (Duncan 2005). Torres-Rouff (2005) determined that, compared to earlier population groups, the pre-Conquest Chilean peoples were utilising the cranial modification as a unification of ethnic(tribal) identity. Duncan (2005: 182), however, found that as little as 37% of the individuals in some of the studied groups had intentionally modified crania. This, strangely, did not lead him to speculate as to WHY so few individuals had their crania modified. Was this not an important part of identity construction to those with unmodified crania? Were the individuals damaged somehow—their souls lost perhaps—before the modification could be started? This type of investigation might lend more to the understanding of age and personhood in pre-conquest America.

4.4 Sex and Gender

Sex and gender are intertwined in traditional Western identity construction. Traditional gender roles have been based on the notion of two separate sexes: Male/Female = Man/Woman. However, it has been demonstrated that this conjoined notion is not valid across cultures, among individuals, and has altered throughout time (Crass 2001, Díaz-Andreu 2005, Hollimon 2011, Sofaer 2006a). The Inuit, for example, essentially have no concept of gender (Crass 2000, Guemple 1995). This is not to say that biological sex is unrecognised. However, Inuit people establish roles for themselves and each other based on temperament, ability, and perceived heritage. Females and males can and do fulfil the same roles: hunting, cooking, mending, child-rearing, and so forth. When two people become 'man and wife' it is usually, but not always, a male and female pairing. A male can be a 'wife' and a female can be a 'husband'. The Inuit see a couple as two parts of one function. Whether that whole is comprised of a male-male or female-female paring is not relevant to the Inuit identity (Crass 2000, Guemple 1995).

Additionally, the Eskimo language family does not have a separate designation for male or female. Individuals are designated by neuter pronouns, but more commonly by their role: good hunter, uncle, spear maker, daughter, etc. If an individual holds more than one role, which most people do, that individual can be known by different terms and these terms may seem 'cross-gendered' from the traditional Western perspective.

Gender roles themselves are fluid. This can be the case even within an identity construct. For example, what is acceptable for a woman or man to wear, do, say, and even think to some extent, is rarely the same year to year even within the same society. Top hats, for instance, were a main part of men's dress throughout the Victorian era and into the early 20th century (Henderson 2000). However, (reportedly) the first man to publicly wear a top hat was charged with inciting a riot. The hat was 'calculated to frighten timid people [and a]s a matter of fact, the officers of the crown stated that several women fainted at the unusual sight, while children screamed, [and] dogs yelped' (Thornton 1899: 325).

It should also be acknowledged that, in most societies, people are individuals, not clones of one another: even people of same gender (or age, religion, ethnicity, and so forth). For example, a large percentage of 'masculine' early mediaeval graves from traditions using grave goods include weaponry (Härke 1990, Steuer 1989). These have traditionally been interpreted as males and as warriors (Härke 1990). However, Knüsel (2011), discusses how the late mediaeval warrior status (aka quality and level of knighthood) was not for all males. A male must be of noble lineage and not meant for a life in the Church. In other words, the peasantry and N^{th} son of the lesser earl need not apply. Not all men were warriors.

In general, Meso- and South American infants were genderless until their *héetz-méek'* ceremony (Duncan 2005). During this ceremony, gender was affixed to the infant by actions such as placing gendered tools in the infant's hands, giving the child a gendered name, and binding the head in a masculine or feminine form (Duncan 2005, Torres-Rouff 2005). Duncan (2005: 177) states that there is a general consensus among Mayan researchers that cranial modifications were a key part of socialisation in Mayan culture. He then goes on to outline several studies with a relatively low percentage of individuals with cranial modifications (see 4.3 above). While he does discuss the need to affix gender in the *héetz-méek'* ceremony, he does not consider this in his discussion of the low percentages of cranial modification. Torres-Rouff (2005) found that there was a difference in the head binding between males and females. If impressing gender upon individuals is so important to Maya identity, it seems pertinent to add this to Duncan's (2005) discussion.

As indicated with the Maya, certain tasks are often given to (or expected of) one particular gender over another. For example, a modern primary school teacher is traditionally expected to be a woman (King 1998, Skelton 2003, 1994). Men who are teachers of young children are often viewed with suspicion. In many shamanistic based belief systems, the shaman is a gender in and of itself; whether beginning or becoming as such varying by belief system and by individual (d'Anglure 2003, Hollimon 2001, Price 2002).

Such roles can leave traces in the body. In the 16-19th century population from Ensay, Outer Hebrides, Sofaer Derevenski (2000) discovered gendered differences in the spinal degeneration of men and women which corresponded to ethnographic accounts of a very strict division of labour. Knüsel (2011) found that certain late mediaeval males exhibited signs consistent with comprehensive military training, including robust bones and muscle attachments, fractures and sharp force trauma. These bodily signs corresponded to the circumstances of body deposition and *eorum temporum* documentation to suggest that these men had been warriors (or knights).

Different genders can experience and be affected by health and disease in divergent ways. For example, Geber and Murphy (2012) found that men were 1.7 times more likely than women to exhibit signs of scurvy among adults in their 19th century Irish workhouse population. Workhouse documentation suggests this was due to an inadequate level of nutrition being given to the men in favour of the women and children. This illustrates a cultural concept of how certain genders (and ages) should be treated.

However, in their review of the previous 20-year's work, Kaminsky *et al* (2006) found significant variation between males and females in the incidence of various diseases in a modern, Western population (Fg 4.1). They also list the sex of individuals who are more likely to have certain alleles which have been linked to specific diseases and conditions. They do not give a full accounting of all the conditions and diseases studied; however, those presented in Figure 4.1 are only a partial list. Kaminsky *et al* (2006) admit that the studies surveyed were in need of more thorough analysis of the gender-epigenetics connection to fully understand these highly complex situations.

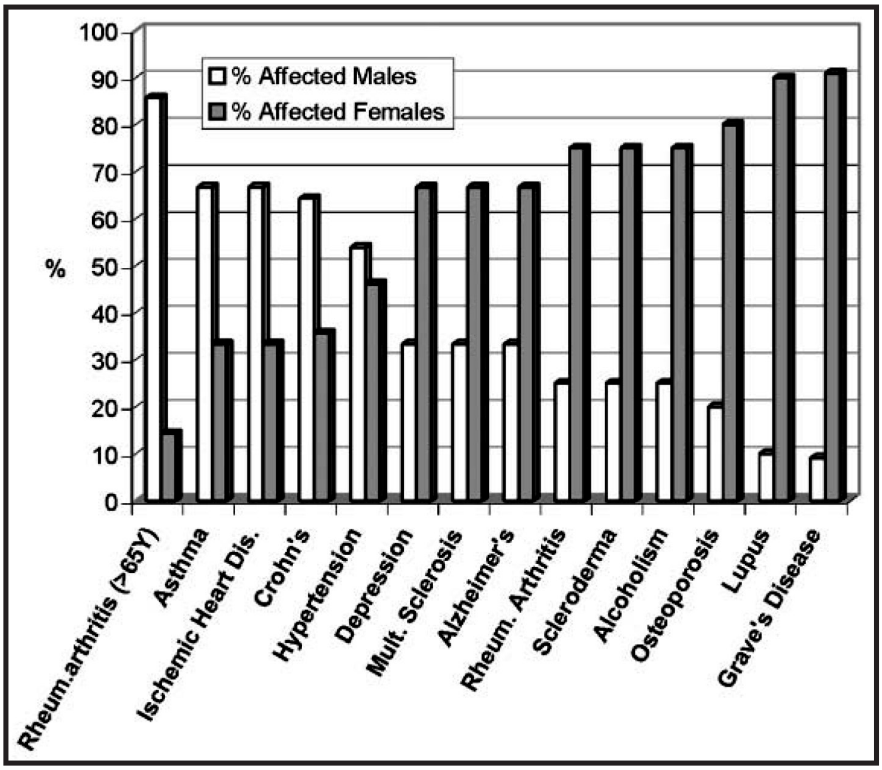


Figure 4.1, Comparison of Disease Rates by Sex (Kaminsky *et al* 2006: 532).

This would seem particularly the case in light of the influences on epigenetic traits and the growing number of acceptable genders in the modern West.

Lastly, not all genders (or ages, religions, ethnicities, and so forth) find their way into the official 'history'. For instance, although females comprise roughly half of the archaeological cemetery population of the world, recorded history generally suggests that, in antiquity, only a small percentage of the population were female. This suggests that alternate ways of learning, such as 'reading' the grave or the skeleton, would provide information missed by these written histories.

4.5 Body Shape, Body Appearance

Human characteristics occur for a variety of reasons, including: climate, geography, diet, disease, activity and occupations, genetic inheritance, and expression of that inheritance (Hunley *et al* 2009, Ousley *et al* 2009, Ricaut *et al* 2010). All of these things contribute to unique individual characteristics and epigenetic shift.

Reproduction passes genes from biological parents to offspring. Fundamentals of DNA heritage insures that the offspring will have many traits in common with his(her) parents. Biological families, therefore, will have many physical traits in common with one another. Outside of modern in vitro fertilisation, people that are in close contact commonly breed with each other. Therefore, groups of people have a phenotype that is generally common to all members of the group: hair, eye and skin colour, facial features, body shape, and so forth (Hunley *et al* 2009, Zakrzewski 2011).

In addition, certain types of activities and ways of thinking will often attract certain types of people (Hogg 2001, McMillan and Chavis 1986, Smith *et al* 2001). For example, Midanik and Clark (1994) found that alcohol consumption decreased significantly in the US from 1984 to 1990 among Whites but remained the same among Blacks and Hispanics (Fg 4.2). The study also showed a difference between married and unmarried individuals, especially those who have been widowed. Other group categories also showed this kind of contrast. Therefore, groups of people who may be unrelated genetically, often have certain traits in common. In this particular instance, the (non) activity of abstinence tended to have a high number of widows, conservative protestants, non-workers (retired persons and homemakers), and those who have had less than a high-school level education. In this example, none of the characteristics are necessarily physical; however, other group categories do lend towards more physical attributes: people carrier (minivan) drivers tend to be female and white (Lezotte 2012, Walsh 2008); practitioners of Santeria tend to be of West Indian, Latino or Afro-Latino descent (Canizares 1994, Gregory 1989), and so forth.

Populations at a particular time and place may have a commonality, and yet these populations will probably not exhibit that same commonality at

	1984 (n = 5221)	1990 (n = 2058)	Current Drinkers, %		Weekly Drinkers, %		Drinkers of Five or More Drinks,[a] %	
			1984	1990	1984	1990	1984	1990
Gender								
Male	2093	869	75.9	71.2	48.9	40.0*	10.6	6.5*
Female	3128	1189	63.9	59.4	24.4	18.8*	2.2	1.4
Age, y								
18–29	1515	442	77.8	73.1	40.1	32.2*	10.3	7.0
30–39	1277	520	77.6	70.7	42.3	30.0*	7.7	3.0*
40–49	711	330	68.9	68.4	33.5	29.0	4.6	3.8
50–59	593	228	66.1	61.9	36.9	32.8	4.2	3.3
60+	1092	538	53.5	49.4	25.5	22.4	1.2	1.5
Gender and age								
Male								
18–29 y	621	201	81.7	76.5	52.3	44.4	17.6	11.0
30–39 y	511	209	86.7	72.5*	60.0	39.2*	12.4	4.3*
40–49 y	305	146	77.5	71.8	44.7	38.5	6.0	6.8
50–59 y	235	102	70.7	64.6	48.4	43.5	8.7	6.2
60+ y	413	211	58.8	65.6	36.0	34.8	2.5	3.1
Female								
18–29 y	894	241	73.9	69.7	28.2	19.7	3.1	3.0
30–39 y	766	311	69.3	69.0	26.4	20.9	3.5	1.7
40–49 y	406	184	62.3	65.1	24.8	20.1	3.6	1.0
50–59 y	358	126	62.2	59.8	26.9	24.2	0.2	0.9
60+ y	679	327	48.9	37.0*	16.5	12.9	0.2	0.2
Marital status								
Married	2619	1191	68.5	65.7	35.0	28.1*	4.8	2.3*
Separated	367	84	74.8	69.2	38.4	19.9	4.3	.8
Divorced	554	221	71.9	69.0	38.5	36.1	7.2	7.9
Widowed	578	220	51.5	41.6	22.3	17.0	2.3	1.9
Never married	1101	341	78.8	69.6*	43.2	35.3	12.1	8.7
Ethnicity								
Black	1947	261	61.6	61.6	29.5	25.8	4.1	3.5
White	1777	1570	71.0	65.9*	37.3	30.2*	6.4	3.5*
Hispanic	1453	150	65.4	66.6	29.5	26.5	4.6	8.9
Other	44	77	64.1	57.0	31.0	21.6	11.1	1.4
Household income								
Above median	1463	913	78.2	73.8	42.6	31.7*	5.8	2.5*
Below median	3405	1031	62.0	56.1*	30.0	25.5	6.7	4.9
Employment status								
Work full-time	2456	1040	78.8	73.7*	44.1	35.2*	8.4	4.3*
Work part-time	452	241	72.6	65.6	34.6	18.9*	5.4	3.6
Retired	717	343	53.0	51.7	23.9	25.1	1.2	2.0
Homemaker	892	227	52.3	44.2	19.8	12.8	1.9	1.1
Other	702	207	66.2	59.9	34.5	30.4	8.5	7.3
Religion								
Catholic	1730	510	82.5	78.6	43.0	37.3	8.5	6.7
Jewish	58	36	88.2	91.8	50.6	30.2	.3	0
Liberal Protestant	412	360	83.4	72.6*	47.6	36.1*	5.4	1.0*
Conserv Protestant	2568	887	53.6	51.1	23.6	19.3	3.6	2.2
Other	437	197	79.3	75.4	48.8	37.1	13.4	9.3
Importance of religion								
Very	3406	1087	56.5	51.5	23.8	18.8*	2.5	1.4
Somewhat	1357	696	84.0	81.0	48.3	39.0*	9.7	5.4*
Not really	283	180	85.8	75.7	53.8	41.6	10.2	9.9
Not at all	112	89	81.9	77.6	54.4	47.1	15.3	9.0
Education								
<High school	2063	479	53.6	50.4	27.8	23.5	5.2	6.3
High school	1628	779	71.9	66.3	35.3	26.4*	9.2	3.8*
Some college	935	401	73.2	70.2	37.3	30.6	4.4	3.1
College graduate	583	397	84.0	75.4*	47.9	39.8	3.4	1.8

Figure 4.2, Demographics of Drinkers in the United States (Midanik and Clark 1994: 1220).

another time or place (Hamilton 2009, Hedrick 2011). Violence, war, plague and famine can kill enough people to impair the gene pool. Soldiers who opt or are mandated to remain in a particular region add new heritage patterns to trait variability. Rape also introduces new genetic combinations into an otherwise conscribed genetic ancestry.

Genetic and epigenetic heritage will remain the most stable in very isolated populations (Hamilton 2009, Hedrick 2011). However, even these populations will not maintain the same genotype or phenotype indefinitely. The population in question may not move; however, climate change, famine or a change in what is considered 'proper food', altered concepts in how to walk, stand, sit, and so forth, will also have an effect on the phenotype of the population (Aamodt and Wang 2012, Campbell 2007). Thus, changes in culture and other identity rules can affect populational appearance. Additionally, DNA copy error will alter the genetic makeup of all subsequent generations.

4.5.1 Race, Ethnicity, and Family

From birth, humans learn what is important to know about navigating and surviving in the world (Aamodt and Wang 2012). Knowing how to distinguish one person from another is a routine part of this process (Bar-Haim *et al* 2006, Gallese 2001, Mandler 1992). However, all biological function has a cost. Nutrients and calories are used by the body to fill those costs. The body expends effort on information that has a good chance of being used. Cues that are not an important part of this distinction will not be stored in the brain. Traits such as eye shape, hair colour, speech patterns, body shape, and so on become linked in the brain's pathways to concepts such as ally, cohort, and straightforward (Aamodt and Wang 2012, Kinzler and Spelke 2007).

The process is extremely intricate. In other words, certain traits, and parts of that trait, will be learned in minute detail; yet, other parts of that trait, or other traits, will only be recorded in the brain as broad generalisms (Aamodt and Wang 2012, Gliga *et al* 2008, Seehagen and Herbert 2012). This is the reason a local can distinguish an outsider by his/her verbal ‘accent’, but may not be able to pinpoint where the ‘accent’ is from or may only be able to guess an approximate region. Although not an excuse for bigotry, it is this very reason that the phrase ‘They all look alike’ when applied to members of a group outside one’s own, is actually a valid circumstance simply due to the fact that the brain has not yet imprinted the important, but subtle, clues to distinguishing this group of ‘others’ (Lorenzi-Cioldi 1993, Quinn and Eimas 1996, Shapiro and Penrod 1986).

In theory, the concept of race is similar to that of breed, while ethnicity is a social group that shares a common, distinctive culture, religion, language, and ancestry (Anderson 1991, Gravlee 2009, Hall 1990, Nagel 1994). In practice, however, race, ethnicity, and ancestry are enmeshed, inseparable, and the criteria determining one race/ethnicity/ancestry from another change from one identity construct to another. For example, in South Africa there is a separation between Blacks and Coloureds (Adhikari 2005, Goldin 1987), while in the US both of these groups would be considered Black. In these cases, the underlying notion is peoples of African ancestry. In Australia, however, the term Black is only used for the Aborigines (Stratton 1998). Peoples of African descent are considered African. The term White is only used for peoples of Northern European origins. Peoples of Southern European descent are considered Ethnic.

Traits such as hair and skin colour, eye shape and facial structure are common in the establishing of race. These are the things which classify a given individual as belonging to one race/ethnicity/ancestry or another, and the things which the brain filters as important or unimportant to retain.

While many of these racial characteristics are no longer available after soft tissue decomposition, other characteristics *are* available which *do* suggest a population affinity, cranial and facial shape being the most commonly used (Hennessy and Stringer 2002, Ousley *et al* 2009, von Cramon-Taubadel 2011).

However, while racial characteristics are of socio-cultural importance, the criteria defining those races does vary from culture to culture, by individual beliefs, and again, across time (Lozada 2011). What makes an individual a part of the group or an outsider in another identity construct can be at odds to the modern, Western way of thinking. Family, for instance, is often considered the primary ancestral group (Dumont 2006, see also Jones 1997: 65-72 for a criticism of the treatment of this hypothesis in the literature). The concept of family is not understood in the same way by all people. Many Native American groups are matrilineal and people who are connected genetically through the biological father are in no way considered family (Kersey and Bannan 1995, Stremlau 2005, Villamarin and Villamarin 1975).The Na of China are matrilineal to the extent that not only are paternal relations not considered family, there is *no such thing* as a father (Hua 1995). The peoples of the Sepik Estuary in Papua New Guinea view children as a claim and not genetics (Lipset 1997). A wife will gain *mana* (power) for her husband by becoming pregnant with the genetic child of another powerful man. In this way she is adding the other man's power to her husband's family. The child is seen as her husband's actual child, not as adopted or as illegitimate.

Pertinent to the discussion of the early mediaeval period is the concept of fosterage. Chapter 2 discusses the importance of fosterage in the early mediaeval North. Foster parents were often not biologically related to the fostrati; however, the bond between the fostered and fosterers could easily became stronger than the one between biological parent and child (Bitel

1996, Crawford 1999, Hansen 2008). Fosterage, then, added to one's kin group, essentially creating what is understood as a family, regardless of biological affinity. Bartlett (2003) argues that in 10-13th century Europe, ethnicity had little to do with biological characteristics and everything to do with cultural attributes: customs, language, and law. This implies that any bioarchaeological analyses performed to determine populational affinity should be undertaken with caution.

4.5.2 Adult Stature and Limb Ratios: Length

Stature is traditionally used as an indicator of health and nutrition, specifically at the population level and specifically concerning the 'stunting' or 'healthy growth trajectory' of juveniles (Bogin and Varela-Silva 2010, Inwood and Roberts 2010). Studies have shown that populations under stress do tend to have a shorter stature than healthy populations (Gowland and Thompson 2013, Inwood and Roberts 2010). Stature, however, is an intricate outcome of genetics, environment, individual health, and individual nutrition; for which this simplistic conclusion has been criticised (Bogin and Varela-Silva 2010). In fact, at least forty genes are known that contribute to terminal height, yet they account for only five percent of human variation (Aamodt and Wang 2012).

The body can and does only expend energy for which it has resources. Thus a body which receives a less than appropriate level of nutrition will not have the resources available to produce height. This would also be the case if a body were required to focus its efforts on fighting a disease or parasite. Theoretically, a population under physical stress would be stunted in comparison to a healthy one. Additionally, stress has been linked to a greater disparity between male and female stature (Kanazawa and Novak 2005, Malina *et al* 1985, Zakrzewski 2003). Thus, the level of sexual dimorphism in stature can be an indicator of the level of societal stress, and not specifically health.

However, it is as yet unclear as to the exact interplay between genetics and environment. Bergman's Rule suggests that colder climates promote shorter stature, indicating that the small-but-healthy hypothesis is accurate (Cowgill *et al* 2012). Studies have also shown that altitude and climate have a strong correlation to terminal height and overall body proportions (Cowgill *et al* 2012, Kanazawa and Novak 2005, Little *et al* 2013). There is, therefore, the potential for people living at different times and in different areas to be of varying stature and yet comparable health.

A number of general rules come into play when we examine the evolution of the physical features and body proportions in any warm-blooded animal. Mentioned above, Bergman's Rule states that bodies which adapt to cooler climates will be larger than those in warmer climates (Cowgill *et al* 2012, Graves 2004). This pattern theoretically results from small bodies retaining heat better due to the smaller surface area. An extension of Bergman's Rule is Allen's Rule which states that protruding body parts, such as arms and legs, are generally shorter in cooler climates, also as a method of heat retention. Pomeroy *el al* (2012), for instance, compared two modern populations within Peru: a cold climate Highland group and a warmer, coastal lowland group. The Highland children had significantly shorter limbs than the lowland group.

A further component of this limb shortening is limb proportions. Holliday and Hilton (2010) found a lower brachial and crural index in the cold adapted populations of Alaska. In other words, the ratio of the forearm to the upper arm (brachial index) is lower—the forearm is shorter—with the same occurring in the lower limb (crural index)—the tibia is shorter—in cold adapted people. Like stature, the specific aetiology of varying limb ratios is unclear and is most likely the result of a complex interaction of variables (see Holliday 1999 for a good deconstruction of these characteristics). Of course, only the lower limb will contribute to the terminal height of an individual.

These features, stature and limb length, can lend insight into the health and environment of an individual or a population. They can also be an important component of identity construction. For instance, some cultures value certain heights above others (Herpin 2013, Kroger 2007). Being ‘short’ or ‘tall’ when compared to the surrounding population can be a factor in societal status and personal feelings of worth (Gordon *et al* 1982, Shepperd and Strathman 1989). Ammianus Marcellinus (4th century Roman) was particularly in awe of the Gaulish women in part because of their height (Marcellinus 2014). Additionally, there is evidence to suggest that leg length, or the ratio of the lower limb to the torso, is valued differently across cultures and across time (Sorokowski 2010). A variation in stature or limb length can reveal information about the identity of the individual(s) in question.

4.5.3 Limb Ratios: Diaphyseal Shape

People not only vary in length (section 4.5.2 above), they also vary in width and depth. As with most of the processes of living, a person’s horizontal size is the result of genetic inheritance, diet, disease, climate, geography, and activity, to name but a few (Hunley *et al* 2009, Ousley *et al* 2009, Ricaut *et al* 2010). Outside of (epi)genetic programming, while limb length may more to do with temperature acclimation, there is considerable evidence to suggest that limb shape is related to biomechanics and usage plasticity.

Habitual activities tend to shape the skeleton for biomechanical efficiency (Knudson 2007, Özkaya *et al* 2012, Pearson and Lieberman 2004, von Cramon-Taubadel *et al* 2013). As living tissue, normal, healthy bone has the ability to transform itself in order to best support and operate the body that surrounds it (Pearson and Lieberman 2004, Ruff *et al* 2006): a once round shaft diameter will become oval, cortical bone will widen and densify, axes will twist and bend as the skeleton adapts to the demands of the environment. Therefore, bone which has been consistently used in a similar manner on a regular basis, may appear differently than one which has been used for a different purpose (or not at all). For example, in their well known study, Jones *et al* (1977) found a significant increase in cortical hypertrophy in the playing arm of tennis athletes, compared to the non-playing arm and to the arms of non-players.

There is also evidence to suggest that alterations in bone shape, particularly in cross-section, are primarily made during childhood (Dysart *et al* 1989, Gosman *et al* 2013, Rhodes and Knüsel 2005, McKay *et al* 2011, Rauch and Schoenau 2001, Shaw and Stock 2009), while changes in the entheses and overall bone robusticity occur during adulthood (see Section 4.5.3 below). For example, Wescott (2006) found that the adult shape of the proximal femur (meric index) is established by about age 5; and Shaw and Stock (2009) found that the shape of the tibia (cnemic index) was correlated with specific activities of adolescent athletes.

This is, of course, a considerable oversimplification (see Myszka and Piontek 2013, Ruff *et al* 2006, Schwartz 2014, Villotte and Knüsel 2013). However, with caution, evaluating the diaphyseal shape of the limbs can lend information as to the activity and mobility patterns of people in the past.

4.5.3 Entheses

While the skeleton cannot be viewed simply as a hanger used to prop up the body's soft tissue, this is *one* of the purposes of the skeleton and a considerable portion of that soft tissue *does* attach to bone. Entheses are the places where tendon, ligament or joint capsule connects to the skeleton (Shaw and Benjamin 2007). These entheses alter according to the level and type of stress (Benjamin *et al* 2006, Hawkey and Merbs 1995, Slobodin *et al*

2007). When an individual makes use of the musculoskeletal system, small micro-tears or fractures occur (Benjamin *et al* 2002, Benjamin *et al* 2006, Shaw and Benjamin 2007). The body then proceeds to repair those fissures and will ‘over build’ in that area in order to avoid future fissures (Benjamin and McGonagle 2001, Fung *et al* 2009).

There are different types of attachments that vary according to what is being attached and how that feature is used (Benjamin *et al* 2002). There are, however, different kinds of entheseal sites; some which are more helpful in determining the usage of a given muscle than others (Benjamin *et al* 2006, Slobodin *et al* 2007, Villotte 2006). Although highly simplified, fibrous tendon attachments can be defined as osseous or periosteal depending on how the enthesis connects with bone (Benjamin *et al* 2006, 2002, Shaw and Benjamin 2007). Fibrocartilaginous entheses are also osseous; although, their structural makeup differs from the fibro-osseous attachments. As a result, fibrocartilaginous attachments are more prone to spicule formations than their fibro-osseous counterparts (Benjamin *et al* 2002, Capasso *et al* 1999, Slobodin *et al* 2007). Only fibrocartilaginous entheses have been shown to vary between occupational usage (Villotte and and Knüsel 2013). Use of the attachment, say in muscle movement, will alter the enthesis in an attempt to buttress the connection to the tendon and minimize the risk of damage in the face of high levels of mechanical loading (Shaw and Benjamin 2007). A healthy alteration should present as an increased amount of, often rugged, cortical bone at the attachment site (Fg 4.3, Benjamin *et al* 2002, Villotte and Knüsel 2013).

Cartilage is avascular; therefore, repair of this feature takes more time. If proper time is given in-between usage of an enthesis, the osseous portion of the entheses will increase in robusticity. However, if the enthesis is not given proper time to repair and fortify itself, thinning, weakening, tendinous ossification, bone spicules and spurs, lesions, and necrosis can occur (Alves

Figure 4.3, Healthy Attachment of Left M. gluteus medius. Arrows Indicate a Smooth Imprint with Regular, but a bit Rugose, Margins (Modified from Villotte and Knüsel 2013: 137).

Cardoso and Henderson 2010, Benjamin *et al* 2006, Henderson 2009, Rogers 2011, Slobodin *et al* 2007, Villotte 2006). The reason for any particular pathology (enthesopathy) is the result of a complex mixture of the type of enthesis, biology, genetics, environment, health, disease, age, and the amount or type of use or over use (Ruff 2008). In modern medicine, some of these pathological changes are so well known, they have been given their own activity-related eponyms: tennis or little league elbow (humeral epicondyloses), jumpers' knee (proximal patellar tendinopathy), and so on (Shaw and Benjamin 2007).

Lovell and Dublenko (1999), for example, discovered a large stress lesion at the superior tibio-fibular articulation of the right leg on two males from the Canadian Fur-Trade era (19th century). From ethnographic and documentary sources, they deduced that this was probably from repeated kicking during the propulsion of dog sleds (Fg 4.4). Oates and colleagues (2008) used the robusticity and pathological changes to the entheses throughout a skeleton at the site of Tell Brak (3rd millennium BC), along with documentary evidence, to speculate that the individual in question had been an acrobat.[1]

It must be firmly established that, although certain changes to the skeleton tend to occur when a given occupation or activity is preformed,

1 See Jurmain and Roberts 2008 for a rebuttal to this article.

those specific activities are by no means the only actions which can cause those changes (Jurmain and Roberts 2008). In addition to the other influences which affect activity related changes (genetics, disease, nutrition, environment, and so forth), those changes are often caused by a type of action, a general category of movement, and not necessarily one specific occupation or activity. For example, Hawkey and Merbs (1995) defined a distinctive J-shaped stress lesion at the costo-clavicular ligament site on the clavicle as 'kayaker's clavicle', due to the extensive kayaking of the Thule Eskimo. However, Molnar (2006) investigated this hypothesis with a Bronze Age population from the Baltic and determined a correlation in muscle groups associated with archery and to some extent harpooning, but not specifically kayaking.

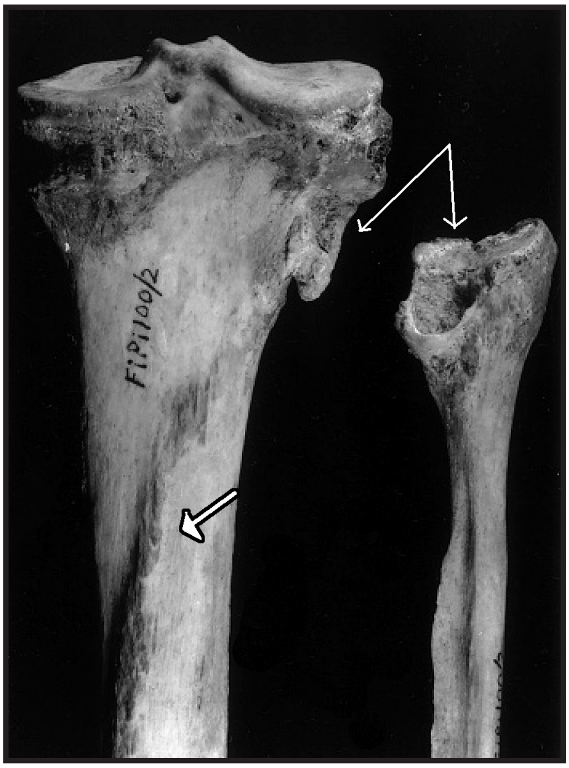


Figure 4.4, Right Tibia and Fibula Showing an Anomaly at the Proximal Tibio-Fibular Articulation–Thin White Arrows. Note the Robust and Rugged Attachment for the Soleus–Wide Outlined Arrow (Modified from Lovell and Dublenko 1999: 253).

This is, yet again, a highly simplistic accounting of a complicated phenomenon. There is much that is, as yet, unclear about entheses formation and the processes which result in any given enthesopathy (Benjamin *et al* 2002, Shaw and Benjamin 2007, Slobodin *et al* 2007, Villotte and Knüsel 2013). In addition, the ratio of cartilage to bone is very high at birth (Baker *et al* 2005, Schaefer *et al* 2009). The progression of life is such that, generally, this ratio will reverse itself; the cartilage gradually becoming bone. Continual use of muscles will also accumulate strength in the muscle attachments over time. Therefore, the robusticity of entheses will generally be greater in skeletally old individuals than in younger ones (Alves Cardoso and Henderson 2010, Milella *et al* 2012, Niinimäki and Baiges Sotos 2013). Additionally the body's ability to repair itself decreases as it ages. Thus, there is a potential for an increase in enthesopathies and lesions in older individuals, and age must be taken into account in any analysis of entheseal changes. However, information on entheseal attachments can give clues about a life and help in the further understanding of identity.

4.6 Arthropathy

Joints are areas where two objects meet. The more stable the joint, the stronger the connection between the objects (Johnson 2008). The stronger the connection, the less mobile the joint. The more unstable a joint is—the more it moves—the more chance that something will be damaged or wear out. In the body, the term joint is used specifically for the area where bones meet and there are three types: fibrous, cartilaginous, and synovial (Rogers and Waldron 1995: 1). The synovial joints are the most mobile and therefore the most likely to show signs of arthropathy; however, any joint can become arthropathic.

As a body ages, it loses the ability to regenerate. Repairing bone and cartilage becomes slower and less definitive (Buckwalter and Mankin 1997, Eubanks *et al* 2007, Felson *et al* 2000). Thus, arthropathies are a natural part of ageing. However, as stated above, the more a joint moves or the greater the load it carries, the more prone it will be to failure and degeneration (Johnson 2008, Samut-Tagliaferro 1999, White *et al* 2012: 441). For example, clinical tests have shown that increased bending of the knee, such as in a squatting motion, has a positive correlation to osteoarthritis in the knee joint

(Coggon *et al* 2000, Cooper *et al* 1994). Activity and even non-activity can influence which joints are affected, how they are affected, and to what extent they are affected (Cooper *at al* 1994, Weiss and Jurmain 2007, Williams and Sambrook 2011). Age plays a primary role in osteodegeneration, as does genetics; however, Stirland and Waldron (1997) found that the heavy occupational activity of the young men on the Mary Rose warship significantly increased the amount of vertebral degeneration when compared to the much older population at Norwich. Therefore, analyses of the joints and joint degeneration can give insight into population diversity and the individual life-course.

4.7 Health and Disease

Previous sections touched on some of the many components which can alter the body from the moment of conception: food, altitude, climate, infection, genetic mutation, body movements, and so on. For example, isotopic studies of the bones and of the dentition can also indicate generally where, geographically, an individual lived at a given point in time and what type of food they ate (Mays 2000, Montgomery and Evans 2006, Parks 2009, Scott and Poulson 2012).

In addition, certain diseases and medical conditions only arise under specific environmental circumstances. Echinococcosis, for instance, is a parasitic infection of sheep or cattle, but the parasite will invade humans through contact with dogs (Eckert *et al* 2001, Lightowlers and Gottstein 1995, Santivanez and Garcia 2012). Malaria is also a parasitic disease which causes flu-like symptoms and can cause death (Centers for Disease Control 2014, The World Health Organisation and United States Agency for International Development 2000). Today it is commonly passed to humans by the mosquito and is endemic in tropical areas of the world. However, there is evidence to suggest that a variant of modern malaria was also passed by biting flies, gnats, and midges, and could have been disseminated in any boggy areas, as seen in Anglo-Saxon England (Gowland and Western 2012, Walker *et al* 2009).

Close work with phosphorus, such as in matchstick or some candle making, has been known to cause necrosis of the mandible, also known as Phossy Jaw (Marx 2008, Roberts *et al* 2016). Contact diseases such as leprosy and syphilis leave distinct lesions on the skeleton when in their advanced states (Baker *et al* 1988, Ridley and Jopling 1966); and tetracyclines, introduced in 1948 as broad-spectrum antibiotics, cause a brownish staining in dental enamel (Sánchez *et al* 2004).

Certain diseases affect, or are more likely to affect, people at different times in life. For example, for the entire US today, heart disease, cancer and stroke are the most common forms of death; however, in the elderly, pneumonia, flu, and diabetes closely follow these three causes, which is not the case for other members of the population (Yoshikawa 2001). Some diseases have traditionally been thought of as ‘childhood diseases’: measles, mumps, chicken pox (Olsen *et al* 1988), because they are more likely to be acquired by the very young.

Some conditions are more likely to be ‘recorded’ in the body at certain times of life. The dentition forms in a more prescribed way than bone (Hillson 1996, Moorrees *et al* 1963a, 1963b); yet, unlike bone, once the dentition is formed, the body can no longer repair or adapt the teeth (Ogden 2008). Stress, whether nutritional, mental, parasitic, disease related or otherwise, can and does alter the formation of the teeth. An essentially permanent ‘mark’ is then made on the individual which indicates that stress occurred when that portion of the tooth was forming. This is can be in the form of interruptions in enamel formation, changes to the enamel density, or discolourations; ie, hypoplasia (Goodman and Armelagos 1985, Hillson 1996: Ch 6, Sect 4). Congenital syphilis can thin the tooth enamel and alter the shape of teeth in the form of Hutchinson's incisors and Moon's or mulberry molars (see Section 8.13.7). Therefore, even the environment in which an individual spends time can leave information about that life which can aid in the understanding of their identity.

The disposition of the body can also reveal the way physical conditions were viewed by past peoples, and how those conditions fit into the process of identity formation (Metzler 2011, 2006, Tilley and Cameron 2014). Trepanation, for example, is a known medical procedure that is used to relieve pressure, commonly from an endocranial bleed, although there can be other medical reasons (Arnott *et al* 2003b, Ortner 2003, Waldron 2009). Evidence of this procedure has been discovered in crania around the world from as far back as at least the Neolithic (Arnott *et al* 2003a). However, theories of its use have not been limited to the surgical. Mednikova (2003) found that 80 of the 400 crania discovered an Iron Age cemetery in southern Siberian were not only trepanned, they appeared to receive a special interment in the form of distinctive death masks. This presentation of the dead implies that trepanation played a ritualistic role in the deaths or burial of these individuals.

Additionally, specifically what defines health, disease, and disability is a social construct in and of itself. For example, the Maasai of Africa do not have a concept of 'the disabled' as a societal category (Talle 1995). Instead, they view life as highly variable and bodily condition as a natural state of being. In east Asia, however, individuals with disabilities are generally seen as defective, often bringing shame upon their families (Fritsch 2009, Kim 2012, Miles 1995). Even so, a 20–30 year old male was excavated at the 4000 year old site of Ban Mac in Vietnam who had been paralysed in childhood from at least the waist down (Tilley and Oxenham 2011). This implies a considerable level of familial or community care to maintain his life for so long, and also suggests that his disability was not viewed as contemptible. Therefore, the (ill-)health of an individual, can lend insight into identity constructs in the past and of the person in question.

4.8 Conclusion

This chapter has given a brief discussion of the body and its role in identity. The theory behind the body and its connection to identity was presented. This was followed by a more targeted discussion of the roles of age, sex and gender. A summary of body shape and size included a discussion of ethnicity and race; followed by activity and environment; and then health and disease as factors in the creation and understanding of identity. The information from this chapter has been combined with that of subsequent chapters to better analyse the dataset of this research. An account of this analysis is available in the Results and Discussion (Chapters 7-9).

CHAPTER 5

Methods

5.1 Collating the Sites

The initial goal of this research was a full accounting of the excavated sites, within the general period of the late 8th to early 13th centuries, that yielded human remains from Scotland and northern England. Site information was gathered using the online CANMORE database (RCAHMS 2016) and the Historic Environment Record (HER) of both Northumberland (Durham County Council and Northumberland County Council 2014) and Cumbria (Cumbria City Council 2014). Inquiries were sent to a variety of institutions in order to locate the skeletal assemblages discovered in the search. A portion of the remains were found to have been reburied. An additional portion was either not located or inaccessible. Formal requests were made for permission to analyse the located extant collections. Permission was granted for the collections listed below. These sites are discussed further in Chapter 6.

<u>From Shetland</u>:

Grutness, St. Ninian's Isle, Sandwick

<u>From Orkney</u>:

Birsay Bay, Breckness, The Bu of Cairston, Bustatoun, Gurness, Newark Bay, Pierowall, Scar, Skaill House, Westness

<u>From Caithness and Sutherland</u>:

Balnakeil Bay, John o' Groats

<u>From the West</u>:

Cnip, Lewis; Iona Monastery, Kiloran, Colonsay; St. Ninian's Point, Bute

From East Lothian:

Captain’s Cabin in Castle Park, Dunbar

From Cumbria:

Carlisle Cathedral

5.2 Database Design

Microsoft Access 2007 was used to create a database management system. One form was created for juveniles, one for adults. All forms linked the fields to separate tables that stored the data types. Each entry was linked directly to the identification code of the individual for which the data was being entered. There is a basic outline of this format in the Appendix (A.1).

5.3 Osteological Analysis

Each individual was analysed macroscopically as per the standards set out in Buikstra and Ublelaker (1994) and Brickley and McKinley (2004). Measurements were taken using sliding or spreading callipers and an osteometric board as the situation required. An endoscope, loupe, and stereo microscope were applied when deemed appropriate. Where necessary, radiographs were taken—with the loaning institution’s permission—to investigate features of interest.

The Biological Anthropology Research Centre at The University of Bradford (BARC) has established recording methods which have been reproduced on A4 sheets to be used in the analysis and documentation of osteological specimens. As this study was at ground level, so-to-speak, it was unknown which information would be useful to document, nor which methods would be the most appropriate. Preliminary studies in this research were based on these recording sheets and altered as deemed appropriate to the research (See 5.5).

5.3.1 Juvenile Estimation of Age at Death

Growth of the human body occurs in a relatively predictable pattern (Boldsen *et al* 2002). For this reason, several features have been shown to reasonably establish an age estimation in non-adult skeletons: epiphyseal fusion, bone measurements (primarily longbones), and dental development (Baker *et al* 2005, Schaefer *et al* 2009). These methods were used in conjunction with one another when possible, with weight being given to dental development and followed by epiphyseal fusion.

5.3.1.1 Ageing Juveniles from Epiphyseal Fusion

Epiphyses are separate portions of any given bone which allow for skeletal growth (Baker *et al* 2005, Schaefer *et al* 2009). These separate pieces eventually fuse to become one bone, completing the main portion of growth. Growth can be and often is affected by genetics, epigenetics, environment, health, disease, and so on (Boldsen *et al* 2002). Even so, epiphyseal fusion has been found to occur at relatively consistent points in time and, as this fusion occurs at different times for different epiphyses, an estimate of age at death can be established.

The epiphyses were selected from the standard recording sheets used by the BARC Labs. These epiphyses, their methodological sources and ageing standards are given in the Appendix (A.2). Again, fusion times vary and age estimation is more accurate if attempted with a known population. As the early mediaeval population studied in this research has been relatively untested, several sources were used. The main source for epiphyseal fusion were Schaefer *et al* (2009) and Baker *et al* (2010), with preference given to Schaefer *et al* (2009) and others used as necessary.

Schaefer *et al* (2009) was given preference due to its comprehensive treatment of juvenile skeletal development, its general acceptance in the field, and its accessibility to this researcher. However, it became quickly apparent, mainly due to the fragmentary nature of the collection in combination with the imprecise age categories (more qualitative than quantitative, see below), that the more concise methods of Baker *et al* (2010) sufficed.

5.3.1.2 Ageing Juveniles from Bone Metrics

Bone measurements show a general correlation to age in juveniles. Metric methods used were also based on standard recording methods used by the BARC Labs which are based on Sundick (1978, See A.2.10). As with the fusion of the epiphyses, fragmentation and the more qualitative age categories did not demand additional methodological sources for cross checking final age determinations.

5.3.1.3 Juvenile Ageing from Dental Development

Skeletal development can and does change due to a variety of factors; not the least of which are health, disease, and nutrition (Bogin *et al* 2007, Brickley 2004, Walker *et al* 2006). Eruption of the dentition, however, tends to occur at a relatively consistent rate, regardless of these factors (Brickley 2004, Liversidge 2008). Age estimates were determined using the Ubelaker (1989) methodology for tooth eruption (Fg 5.1) due to its familiarity, availability, and completeness: ie, eruption times for all deciduous and permanent teeth. While this study is for an early American, Arikara, population, it is still a well used study within the discipline. In addition, Brickley (2004: 21) sees Ubelaker (1989) as a useful guide, particularly when one is not able to utilise root development.

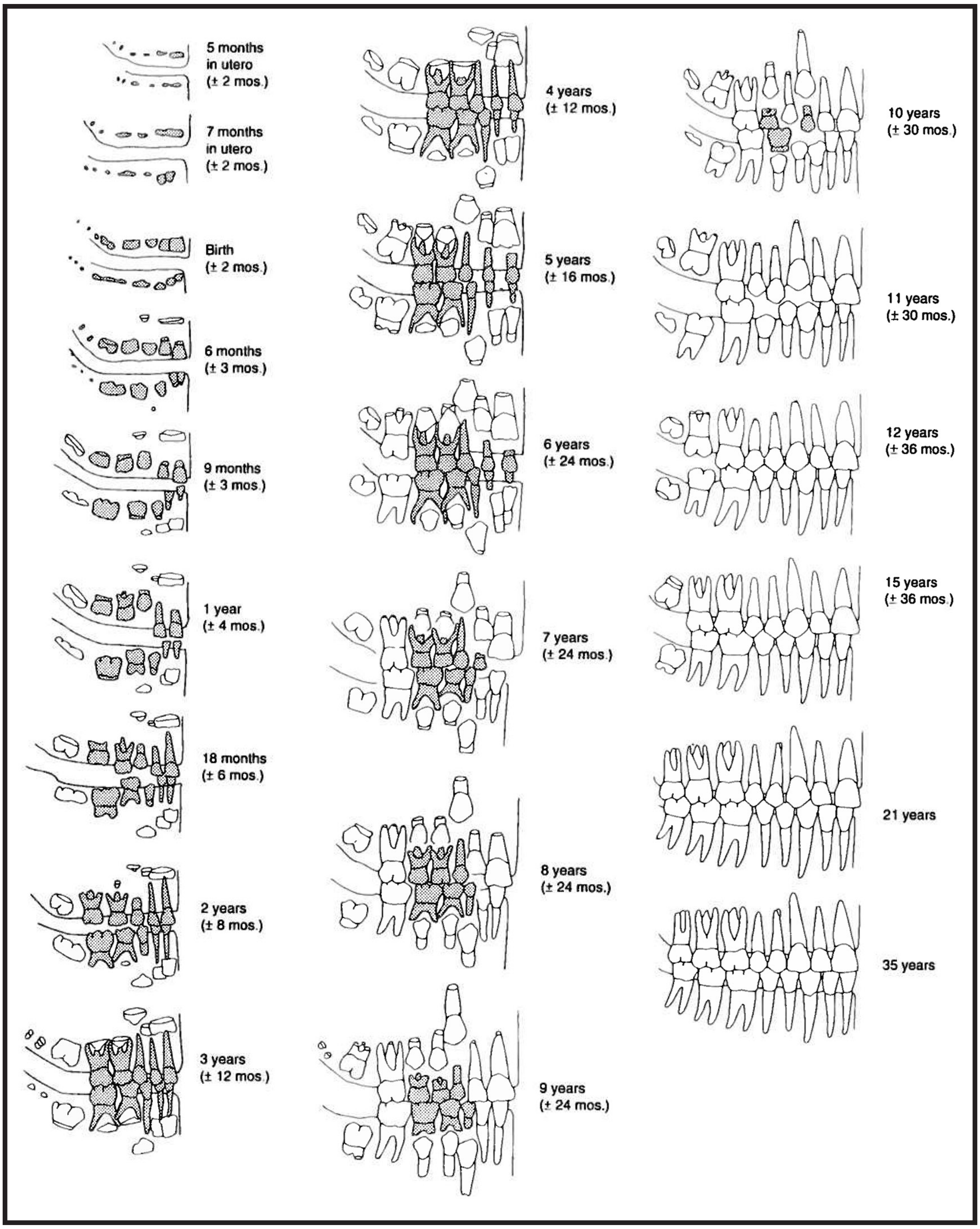


Figure 5.1, Ubelaker (1989) Standards for Estimating Juvenile Age at Death.

5.3.1.4 Juvenile Age Categories

Chapter 2 discusses the complications involved in assigning a chronological age to an individual from an archaeological population. It is uncertain how peoples in the past viewed age or marked time, if at all.

In addition, ageing an individual from skeletal remains can produce a broad range of possibilities along with potentially conflicting results (Hoppa 2002, Kemkes-Grottenthaler 2002, Lampl and Johnston 1996). For this reason, age categories, rather than specific chronological age ranges are preferred. However, all of the ageing methodology is reported in chronological ages and as many researchers do use this more concrete way of age estimation and may wish to compare these results to other work, ages have been given as categories along with the 'corresponding' temporal dates (Table 5.12). It is strongly cautioned that researchers understand these chronological ages are approximations and are for comparative purposes only.

Age Category	Approximate Chronological Age
Neonate	Near the time of birth
Infant	1 to 12 months
Young Child	12 months to 3 years
Middle Child	4 to 8 years
Old Child	8 to 12 years
Adolescent	13 to 18 years
Early Adult	18 to 25 years

Table 5.12, Juvenile Age Categories with Approximate Corresponding Chronological Age.

Once all the available features were recorded, they were compared for similarity. If given in the methodology, the mean age estimation for each feature was used. If any skeletal elements produced an estimation markedly different than that of the dentition, dental eruption was given preference in estimation.

5.3.2 Adult Estimation of Age at Death

After juvenile development is completed, age estimations rely on degenerative changes to the skeleton (Cox 2000, White *et al* 2012). This process is highly variable between individuals and between population groups due to the complexities of genetics, environmental factors, and choices of the given individual. Therefore, methods of estimating age at death in adults represent a skeletal age with a loose correlation to chronology (Kemkes-Grottenthaler 2002, Jackes 2000). In addition, chronological age is not always relevant to the identity of an individual in any given society or identity construct (see Chapter 4). Therefore, ages for adults have also been given as categories (Table 5.13) with the associated chronological age given with the same reasons and with the same cautions as the juvenile ages given above.

Age Category	Approximate Chronological Age
Early Adult	18 to 25 years
Young Middle Adult	26 to 35 years
Middle Adult	36 to 45 years
Mature Adult	46+ years

Table 5.13, Adult Age Categories with Approximate Corresponding Chronological Age.

Once all the available features were recorded, they were compared for similarity. If provided in the methodology, the mean age estimation for each feature was used. The Suchey-Brooks method (5.3.2.1) was given preference if any notable variation in age estimation occurred.

5.3.2.1 Adult Ageing from the Pubic Symphysis

The pubic symphysis is generally considered the most definitive macroscopic method to age adults (Hoppa 2000, Kimmerle *et al* 2008, Schmitt *et al* 2002). The Suchey-Brooks method (1990) has been shown as the most accurate thus far (Hoppa 2000, Kimmerle *et al* 2008). Therefore, this method was used for age estimation. Specifics of this method are located in the Appendix (A.2.11).

5.3.2.2 Age Estimation from the Auricular Surface

The fragile nature of the pubis often results in diagnostic portions of the symphysis not surviving in archaeological circumstances (White *et al* 2012: 400). Methods have therefore been developed to estimate age from the auricular surface—a feature which better survives taphonomic processes. The two most commonly used methods for ageing from the auricular surface produce exceedingly different results. The Lovejoy *et al* (1985) method uses narrow, five year categories. The Buckberry and Chamberlain (2002) method produces some age groupings which are so broad, they are arguably invalid for age estimation (Falys *et al* 2006, Mulhern and Jones 2005). Both methods were used in an attempt to normalise the results.

5.3.2.3 Age Estimations from Rib Ends

In many instances, pelvic elements were not present. In these cases, additional methodology using sternal rib ends was applied to age estimation. This methodology has been shown to be generally accurate across populations (Haj Salem *et al* 2014, Kurki 2005). Therefore, the first and fourth ribs were recorded using the DiGangi *et al* (2009) method for the 1st rib and the İşcan *et al* (1984) method for the 4th (see Appendix). The İşcan *et al* (1984) method is the most well known. Russell *et al* (1993) and Yoder *et al* (2001) performed independent tests of the İşcan method and found it generally reliable. Getz (2011) assessed the DiGangi method and found that observers tended to over age the young. However, with some skeletons in this research, the first rib was the only feature available with which to estimate age: Individual 8 from Captain's Cabin, for instance, whose mean estimated age was 32.07 years using the DiGangi *et al* (2009) method. Therefore, in some cases, the use of ageing from the 1st rib proved beneficial.

5.3.3 Assessment of Sex

Following puberty, biological sex generally differers between males and females. Methods for determining sex have been developed based on these differences. It has been demonstrated that the variations between males and females can and do vary by population and by individual (Stolberg 2003, Walker 2008, White *et al* 2012). Therefore, the assessment of sex from a skeleton can be problematic in an unfamiliar population, sometimes even within a known population. In the collection of data for this research, sex was estimated as male or female, probable male or female, and indeterminate.

Skeletally speaking, sexual dimorphism tends to be the most diagnostic in the pelvis—particularly in the pubis (Bass 2005, Buikstra and Ubelaker 1994, Krogman and İşcan 1986, White *et al* 2012). Therefore, preference was given to the pelvis when establishing sex. Features of the pelvis used to determine biological sex were based on Phenice (1969) and Milner (1992). Morphology of the skull was based on the methods from Acsádi and Nemeskéri (1970). The original published research was used interchangeably with the reprinted versions referenced in Buikstra and Ubelaker (1994).

5.3.3.1 The Phenice Method

The Phenice Method was developed using the pubic bone (Phenice 1969). This has proven to be a very reliable way to sex a skeleton based on the observer's experience with human skeletal anatomy (MacLaughlin and Bruce 1990, Ubelaker and Volk 2002). The features of interest and more specific criteria are found in the Appendix.

5.3.3.2 Sexing from the Preauricular Sulcus

There tends to be little to no preauricular sulcus in males and present in females. This feature can be deeper and broader if parturition has occurred

(Kelly 1979, Maass and Friedling 2014, Novak *et al* 2012). Figure 5.2 illustrates its location. Therefore, traditional sexing methods often use the presence of a sulcus as a sign of skeletal femaleness. This is not, however, always the case (See Ubelaker and de la Paz 2012 for a review). The preauricular sulcus was recorded as either present or absent and was only used in sexing as supplemental support.

Figure 5.2, The Location of the Preauricular Sulcus (Author's Image 2011).

5.3.3.3 Sexing from the Greater Sciatic Notch

The greater sciatic notch tends to be broader in females and more narrow in males (Fg 5.3). However, a number of factors can alter this tendency, making sexing from the greater sciatic notch not as reliable a method as the Phenice (1969) criteria (Rogers and Saunders 1994, Walker 2005, Weaver 2002); a factor which became particularly obvious as work continued with this population. This was, in part, due to the fragmented nature of the skeletons and in part due to the more ambiguous nature of the greater sciatic notch across the collection. Therefore, this method was used as a supplement to the Phenice Method. However, in a few instances this was the *only* feature available for sexing. In these cases, only the indeterminate and probable categories were recorded as estimation categories.

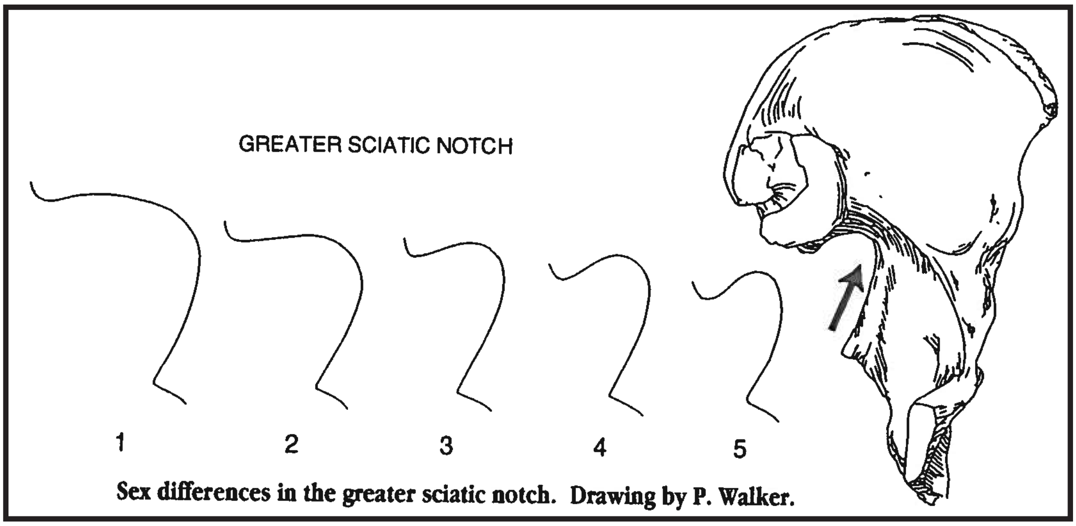


Figure 5.3, Criteria for Sexing from the Greater Scatic Notch. Most Diagnostically Female on Left, Male on Right (Modified from Buikstra and Ubelaker 1994: 18).

5.3.3.4 Criteria for Sexing from the Skull

Criteria have been developed to estimate sex from the skull. Figure 5.4 illustrates the traits used. The gonial angle and horizontal ramus of the mandible were also used. A ‘typical’ male mandible is shown in Fg 5.5 and female is shown in Fg 5.6. The appendix holds more in-depth descriptions.

Cranial features tend to vary across populations and can also vary by individual (Buikstra and Ubelaker 1994: 19, Wescott and Jantz 2006). For example, the standards used for sexing have been generally established using a Western population (Acsádi and Nemeskéri 1970, Stevenson *et al* 2009). However, King (1997), in his study of populations from modern Thailand and Hong Kong, found that there were significant differences in size between the sexes; yet minimal differences were discerned in shape.

In addition, features of the crania are not static throughout life (Tanne and Sakuda 1991). Biomechanics alter the shape and structure of cranial bone (Lieberman *et al* 2004, Paschetta *et al* 2010). Usage will promote rugosity (more ‘male’ appearance). Lack of usage will stimulate resorption and produce a more gracile structure (more ‘female’ appearance).

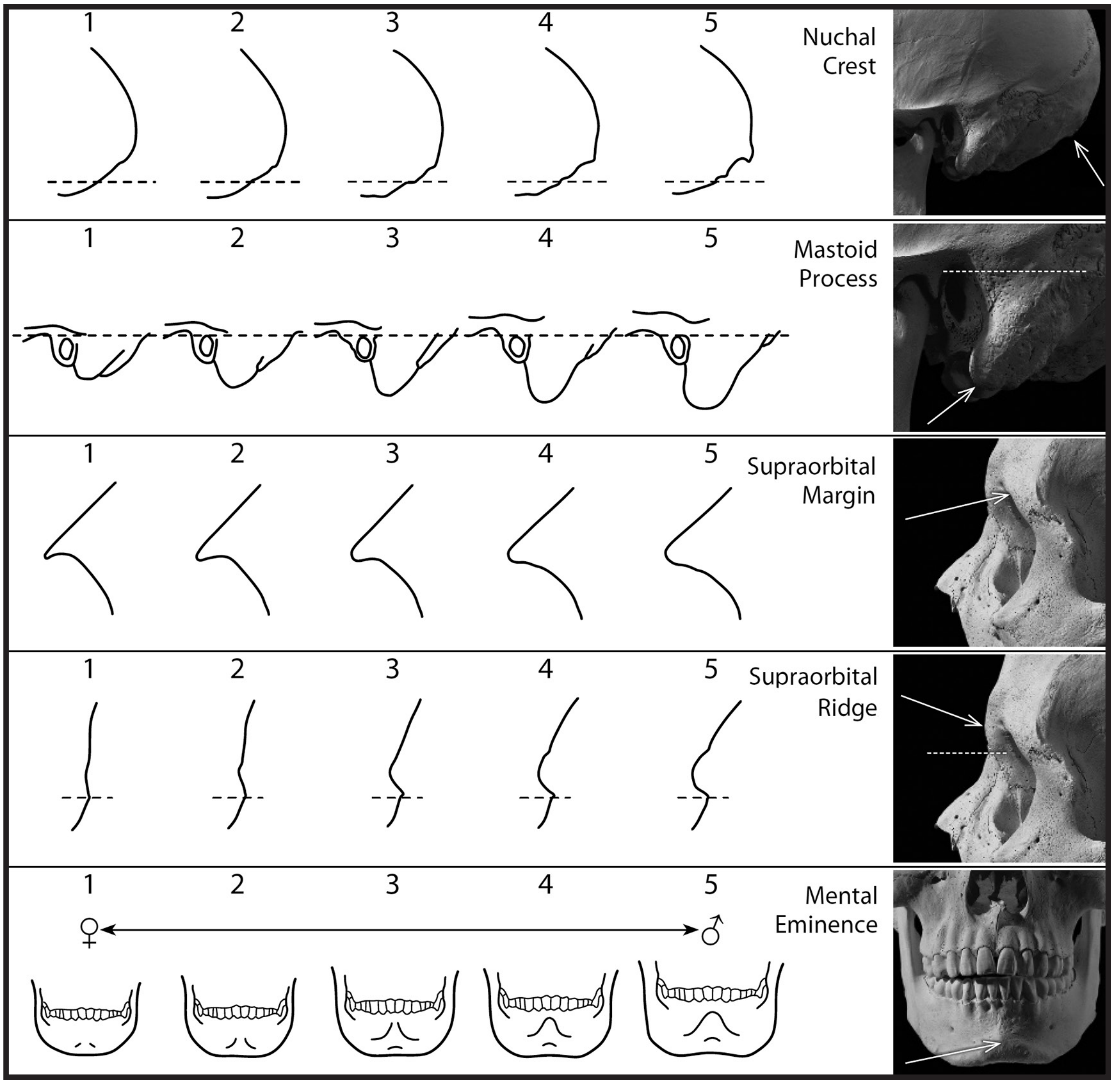


Figure 5.4, Criteria for Sexing from the Skull. Left to Right=Female to Male (Modified from White 2012: 410 which was Revised from Walker 2008).

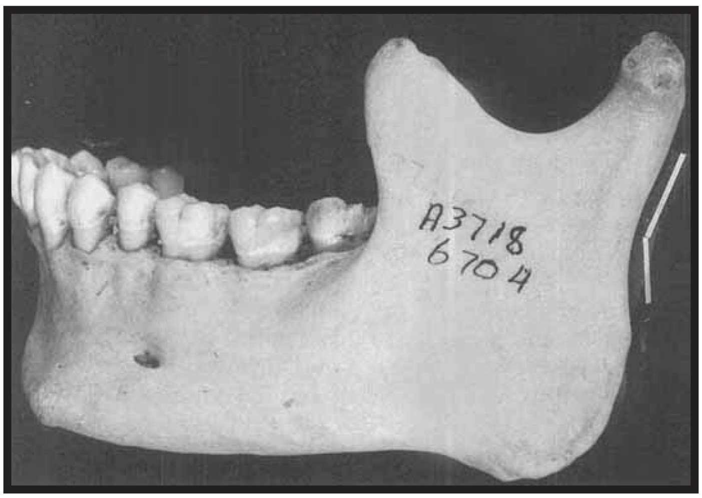


Figure 5.5, Male Mandible. Acute Gonial Angle, Slightly Everted, Some Rugosity, Thick Ramus with Ramus Angle at Dental Occlusal Surface (Loth and Henneberg 1996: 476).

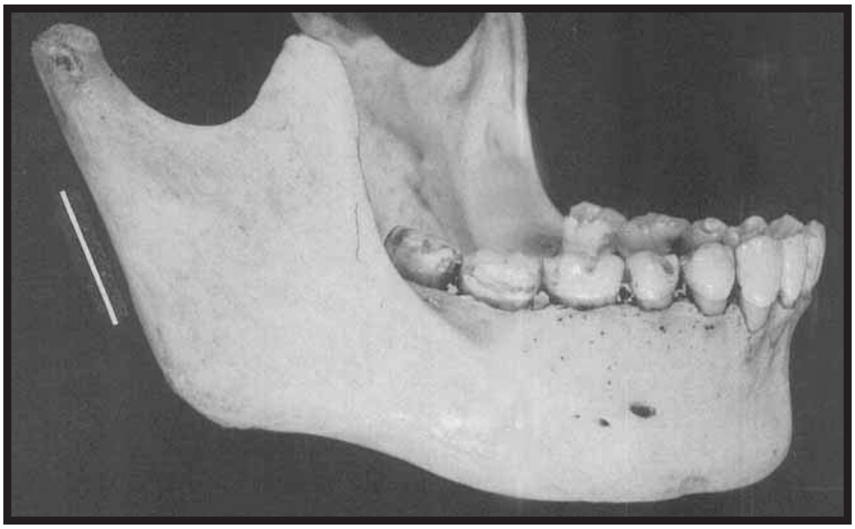


Figure 5.6, Female Mandible. Obtuse Gonial Angle. No Posterior Ramus Flexure (Loth and Henneberg 1996: 477).

Senescence, in particular, tends to produce more sexually ambiguous crania (Doual *et al* 1997, Meindl *et al* 1985, Midori Albert *et al* 2007). This is likely due, to name a few, to decreased usage of the body coupled with the increased inability to generate new bone (loss of robusticity), probable hormone changes, diet and health changes, and loss of dentition, which changes the structure of the jaw (Kemkes-Grottenthaler *et al* 2002, Myszka and Piontek 2013, Pearson and Lieberman 2004). Therefore, the older an individual is, the more likely their crania will be sexed incorrectly. Thus, features of the skull were used secondary to pelvic morphology and were only a primary source when other features were absent.

5.3.4 Metrics

Measurements of the human body are used in sex estimation, ageing, estimating stature, estimating ancestry, and comparing populations. These were taken using industry standard callipers and an osteometric board according to the specifications in Buikstra and Ubelaker (1994). Reconstruction of fragmentary remains was undertaken only if possible without adhesives and when a limited potential for error was established.

Metrics were recorded by individual and directly into the Access database.

5.3.4.1 Cranial Measurements

Figures 5.7 and 5.8 show the landmarks on the skull used in metric evaluations. Table 5.1 gives the measurements taken.

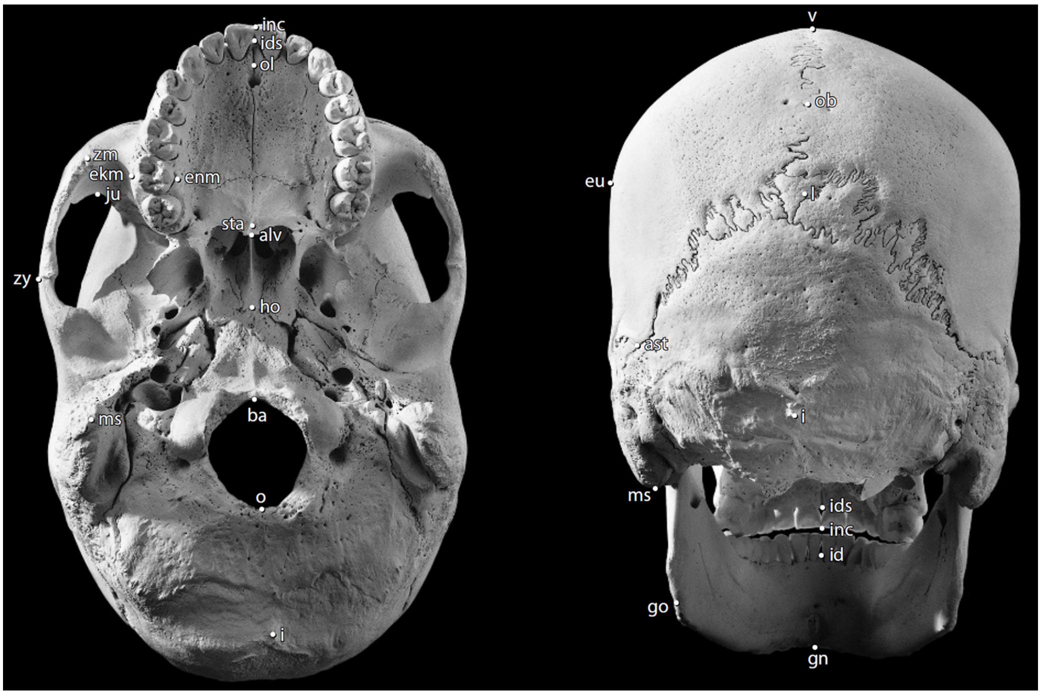


Figure 5.7, Inferior and Posterior Craniometric Landmarks (White *et al* 2012: 56).

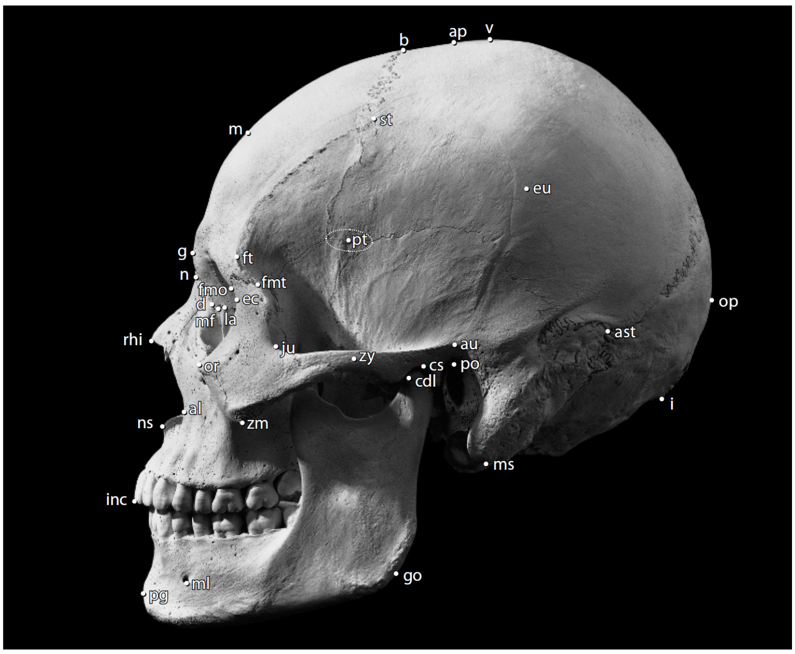


Figure 5.8,

Lateral View of Craniometric Landmarks

(White *et al* 2012: 57).

Measurement	Landmarks Used	Measurement	Landmarks Used
Maximum Cranial Length	g-op	Minimum Frontal Breadth	ft-ft
Maximum Cranial Breadth	eu-eu	Nasal Aperture Height	ns-n
Bizygomatic Breadth	zy-zy	Nasal Aperture Breadth	al-al
Biauricular Breadth	au-au	Orbital Height	Greatest Internal
Maximum Cranial Height	ba-b	Orbital Breadth	d-ec
Cranial Base Length	ba-n	Maxillo-Alveolar Length	pr-sta
Basion–Prosthion Length	ba-pr	Maxillo-Alveolar Breadth	ekm-ekm
Frontal Chord	n–b	Chin Height	id-gn
Parietal Chord	b–l	Bicondylar Breadth	cdl-cdl
Occipital Chord	l–o	Bigonial Breadth	go-go
Upper Facial Height	pr-n	Minimum Ramus Breadth	Anterior-Posterior Superior to go
Upper Facial Breadth	fmt-fmt		

Table 5.1, Measurements Taken of the Crania (White *et al* 2012: 54-8).

5.3.4.2 Post-Cranial Measurements

Post-cranial measurements were used to assess skeletal morphology. Measurements taken are listed below and were based on the recording sheets used by the BARC Labs. Most measurements are standard in the discipline and are relatively self-explanatory (Table 5.2). More specific descriptions are available in the Appendix.

Bone	Feature	Measurement	Source
Clavicle	Entirety	Maximum Length	Buikstra and Ubelaker 1994: 79
Scapula	Glenoid Fossa	Maximum Width	Bass 2005: 123
		Maximum Height	
Humerus	Entirety	Maximum Length	White *et al* 2012: 185
	Epicondyles	Maximum Breadth	
	Head	Vertical Diameter	
	Diaphysis	Maximum Diameter at Widest Point	
Radius	Entirety	Maximum Length	White *et al* 2012: 190
	Head	Maximum Width	
Ulna	Entirety	Maximum Length	White *et al* 2012: 196

Table 5.2, Measurements Taken of the Postcrania.

Bone	Feature	Measurement	Source
Femur	Entirety	Maximum Length	White *et al* 2012: 251
		Maximum Length (Condyles)	
	Head	Vertical Diameter	
	Diaphysis	Antero-posterior width Inferior to Trochanters	
		Medio-lateral width Inferior to Trochanters	
		Antero-posterior width at Midpoint	
		Medio-lateral width at Midpoint	
	Epicondyles	Maximum Breadth	
Tibia	Entirety	Maximum Length	White *et al* 2012: 262
	Condyles	Maximum Breadth at Superior End	
	Diaphysis	Antero-posterior width at Nutrient Foramen	
		Medio-lateral width at Nutrient Foramen	
Fibula	Entirety	Maximum Length	White *et al* 2012: 270

Table 5.2, Measurements Taken of the Postcrania, Cont.

5.3.5 Stature and Lower Limb Shape

The lower limb, particularly femur length, is generally regarded as the most accurate for assessing stature (Bass 2005, Brothwell and Zakrzewski 2004, Buikstra and Ubelaker 1994); therefore, femur length was given priority, followed by the tibiae, humeri, and other long bones. Estimates were ascertained using the formulae published in Bass (2005), established by Trotter and Gleser (1977, 1958, 1952). The meric index—the measurement of sagittal flattening of the proximal femoral diaphysis—and cnemic index—the measurement of coronal flattening of the tibial diaphysis—were calculated with formulae also found in Bass (2005) and based on Brothwell (1981: 88-9).

5.3.6 Vertebral Degeneration and Disease

All vertebrae were examined for signs of degeneration and disease based on Sager (1969), which are the standard for the BARC Labs. The

Condition	Scoring System
Osteophytosis	0, None 1, Barely Noticeable 2, Slightly Raised 3, Spicules 4, Severe 5, Fusion Evident
Porosity	0, None 1, Minor Pinhole 2, Major Pinhole 3, Minor Coalesced 4, Major Coalesced
Eburnation	0, None 1, Slight Polish 2, Excessive Polish 3, Cortical Bone Gone 4, Grooves

Table 5.3, Vertebral Degeneration Scoring.

vertebral information was entered into Access using one field for each type of vertebra to allow for independent analysis of the cervical, thoracic, and lumbar. Data was recorded for vertebral bodies and facets by side and by aspect. Scores were taken for osteophytes, porosity, and eburnation on bodies and apophyseal joints (Table 5.3). These were recorded by location, rim or surface, and by severity. Schmorl's nodes on the thoracic and lumbar bodies were recorded as present or absent. Also recorded as present or absent were cortical defects on the facet surfaces of the apophyseal joints.

5.3.7 Joint Degeneration and Disease

Nineteen joint surfaces were examined for degeneration and disease and are listed below. Preliminary investigations also included the articular surfaces of the hands and feet; however, it was clear in these first examinations that time would be better used in removing these from the recording process.

- Glenoid Cavity of the Scapula
- Acromial Articular Surface
- Medial and Lateral Articulations of the Clavicle
- Humeral Head
- Capitulum and Trochlea
- Proximal and Distal Articulations of the Radius
- Semi-Lunar Notch and Distal Articulation of the Ulna

• The Acetabulum

• Proximal and Distal Articulations of the Femur

• Articular Surface of the Patella

• Proximal and Distal Articulations of the Tibia

• Superior Articulation of the Fibula on the Tibia

Assessments were made for osteophytes, porosity, and eburnation, and scored in the same manner as the vertebrae (Table 5.3 above) for each individual and each side, after the standards set in Buikstra and Ubelaker (1994: 122-3, 157). Cortical defects were recorded as present or absent. See Section 8.7 for further discussion of this topic.

5.3.8 Entheses and Enthesopathy

Section 4.5.3 discusses cartilaginous attachments in the body where muscle meets bone. Scoring of lesions and robusticity was based on the Hawkey and Merbs (1995) criteria (Fgs 5.9 and 5.10) and recorded by side and by individual. Other methods have been proposed (Henderson *et al* 2013, Mariotti *et al* 2007, 2004, Villotte 2006), particularly in light of the growing knowledge of the enthesis complex (Benjamin *et al* 2004, 2002, Schwartz

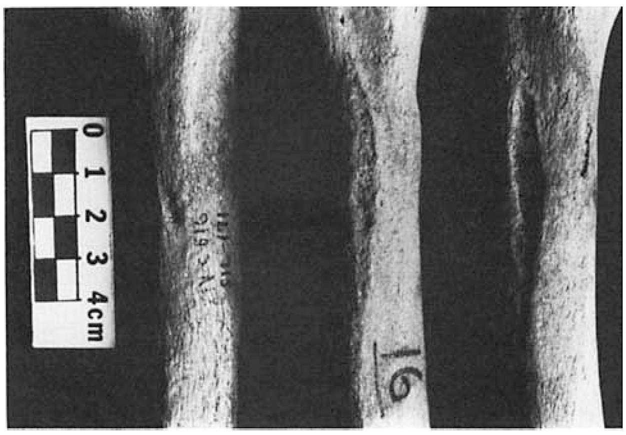


Figure 3. Stresss lesion category at the *pectoralis major* insertion site. Scores from left to right are: **S1=faint**. There is a shallow 'furrow', a pitting into the cortex that has a lytic-like appearance. It is less than 1 mm in depth. **S2=moderate**. The pitting is deeper and covers more surface area. It is greater than 1 mm, but less than 3 mm in depth. It may vary in length, but not longer than 5 mm. **S3=strong**. The pitting is marked, and greater than 3 mm in depth, or more than 5 mm in length.

Figure 5.9, Stress Lesion Criteria for Scoring Entheses (Hawkey and Merbs 1995: 328).

Figure 1. Robusticity category at the *pectoralis major* insertion site. Scores from left to right are: **Absent 0**, **R1=faint**. The cortex is only slightly rounded, and often not visible without viewing under a strong light. The elevation is, however, apparent to the touch, although no distinct crests or ridges have formed. **R2=moderate**. The cortical surface is uneven, with a mound-shaped elevation that is easily observable. No sharp ridges or crests have formed. **R3=strong**. Distinct, sharp crests or ridges have formed. Often there may be a slight depression between two crests (especially noticeable between *pectoralis major* and *teres major* insertions), but the depression does not extend into the cortex.

Figure 5.10, Robusticity Criteria for Scoring Entheses (Hawkey and Merbs 1995: 327).

2014, Shaw and Benjamin 2007) and the recent workshop conducted in Coimbra, Portugal in 2009 (Santos *et al* 2011). However, many of these methods have not, as yet, been thoroughly tested for efficacy. In addition, there is still not enough information as to the meaning behind various entheseal changes to warrant usage of a more complex system, particularly in consideration of the preparatory nature of this research. The Hawkey and Merbs (1995) criteria were chosen for familiarity and simplicity.

Many entheses were chosen in an attempt to be thorough; however, many were abandoned in the interest of time. The following are the locations which were retained:

Clavicle: Pectoralis Major, Trapezus, Deltoidus, Sternocleidomastoideus (Fg 5.11).

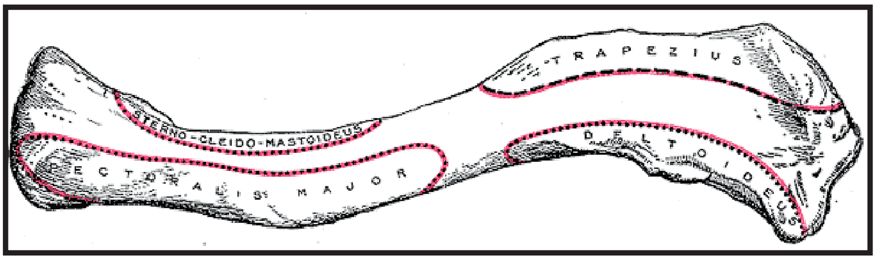


Figure 5.11, Superior Left Clavicle with Attachment Sites (Modified from Gray 2000: Fg 200).

Scapula: Deltoid on the Acromion, Coracoid Process, Long Head of the Triceps (Fg 5.12).

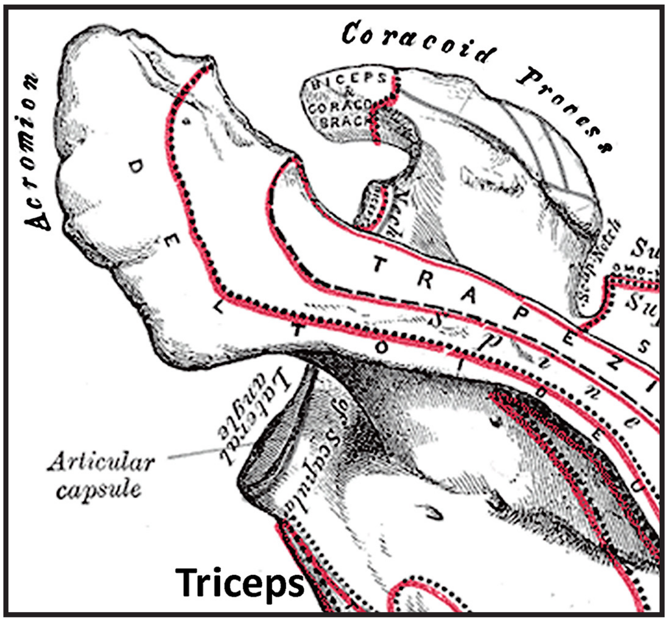


Figure 5.12,

Posterior Left Scapula. Attachments Indicated (Modified from Gray 2000: Fg 203).

Ulna: Triceps Brachii (Olecranon), Brachialis, Supinator (Fg 5.13)

Radius: Biceps Brachii (Fg 5.13)

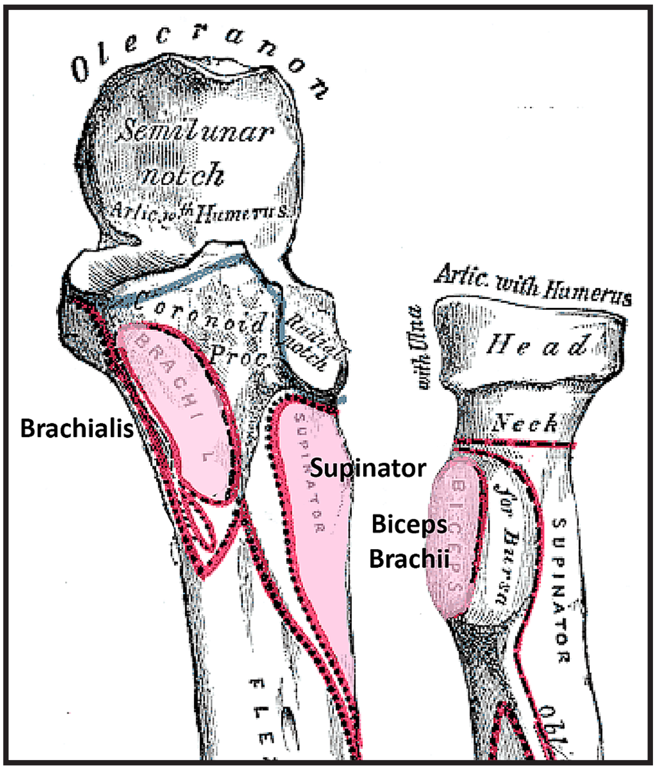


Figure 5.13,

Antero-Superior Portion of the Left Forearm with Attachments Indicated

(Modified from Gray 2000: Fg 213).

Humerus: Subscapularis, Pectoralis Major, Latissimus Dorsi, Deltoideus, Brachioradialis, Extensor Carpi Radialis Longus, Lateral Head of the Triceps (Fg 5.14)

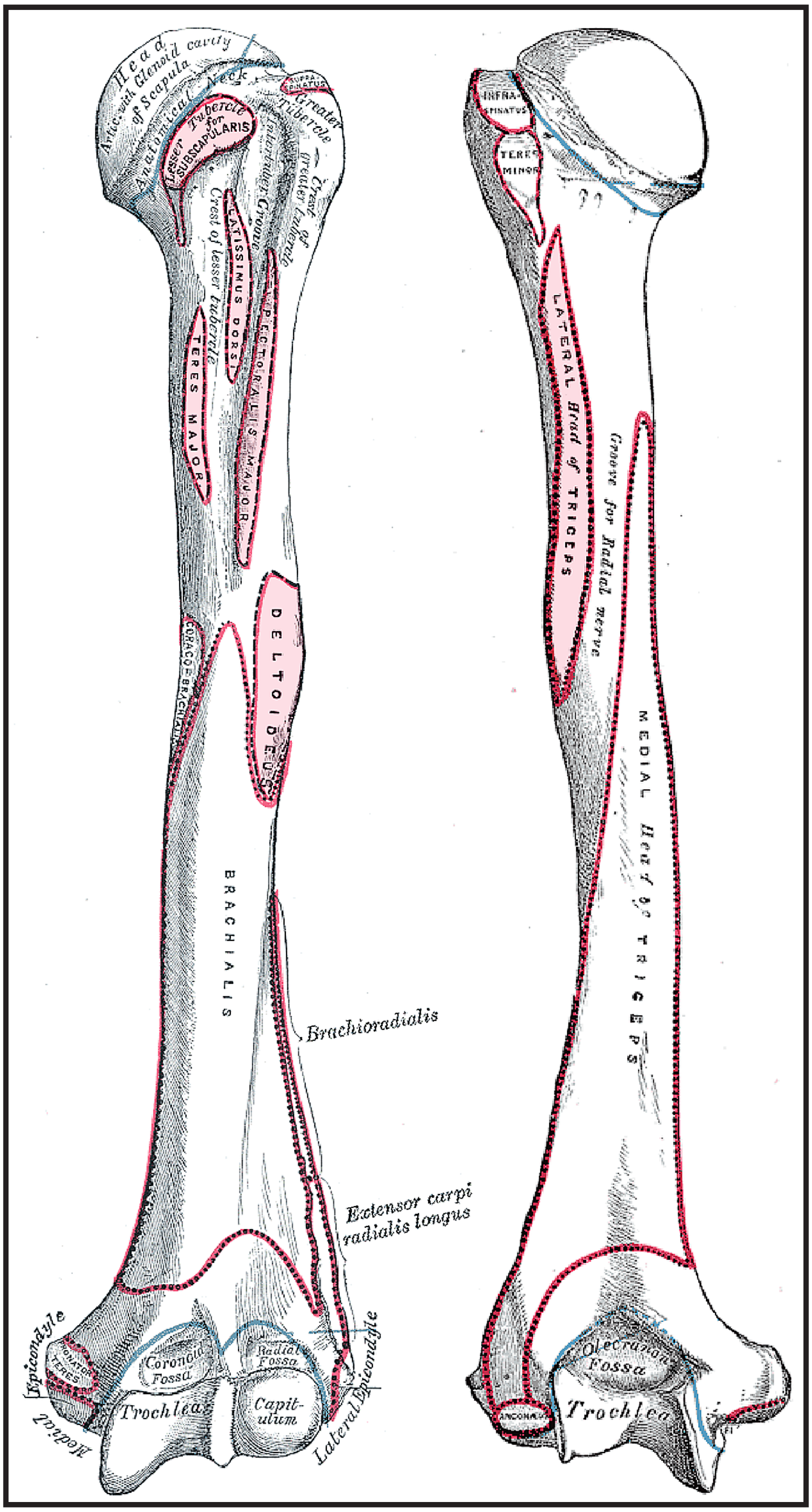


Figure 5.14, Left, Anterior Left Humerus. Right, Posterior View. Attachment Sites Indicated (Modified from Gray 2000: Fg 207 and 208).

Innominate: Iliac Crest, Ischial Tuberosity (Fg 5.15).

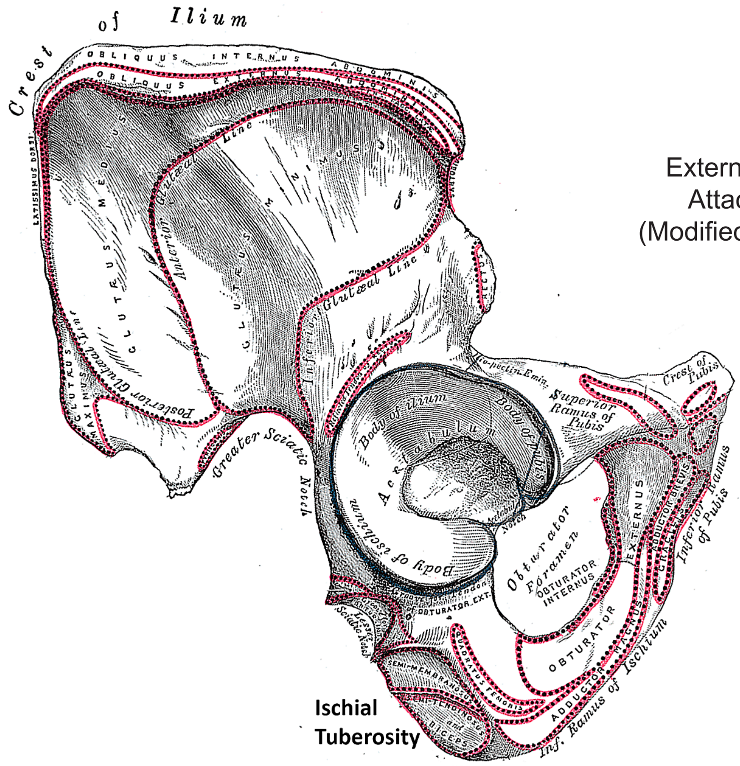


Figure 5.15,

External Right Innominate with Attachment Sites Indicated (Modified from Gray 2000: Fg 235).

Femur: Gleuteus Medius, Obterator Externus, Psoas, Linea Aspera, Medial Head of the Gastrocnemius (5.16).

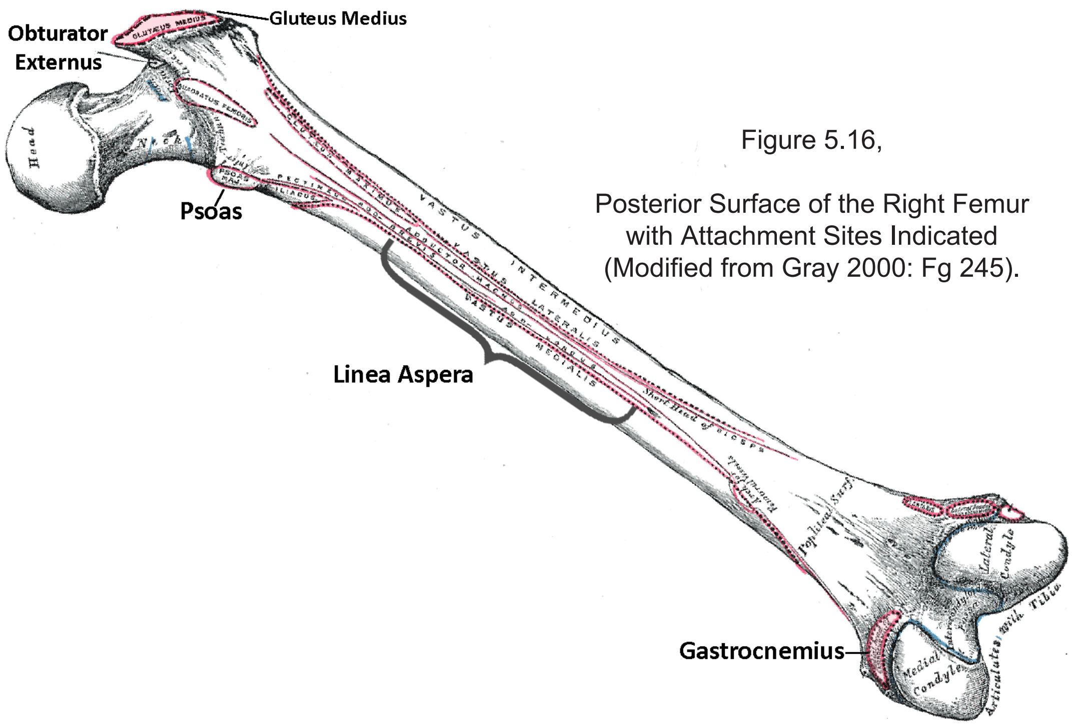


Figure 5.16,

Posterior Surface of the Right Femur with Attachment Sites Indicated (Modified from Gray 2000: Fg 245).

Patella: Anterior Surface (Fg 5.17).

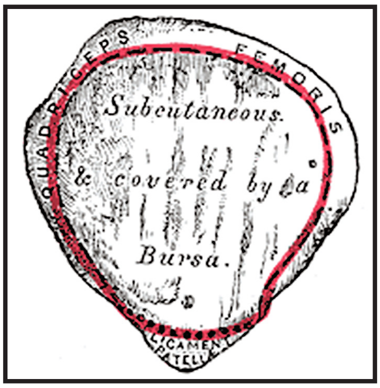


Figure 5.17, Anterior Surface of the Right Patella
(Modified from Gray 2000: Fg 255).

Tibia: Tibial Tuberosity, Popliteal Line (Fg 5.18).

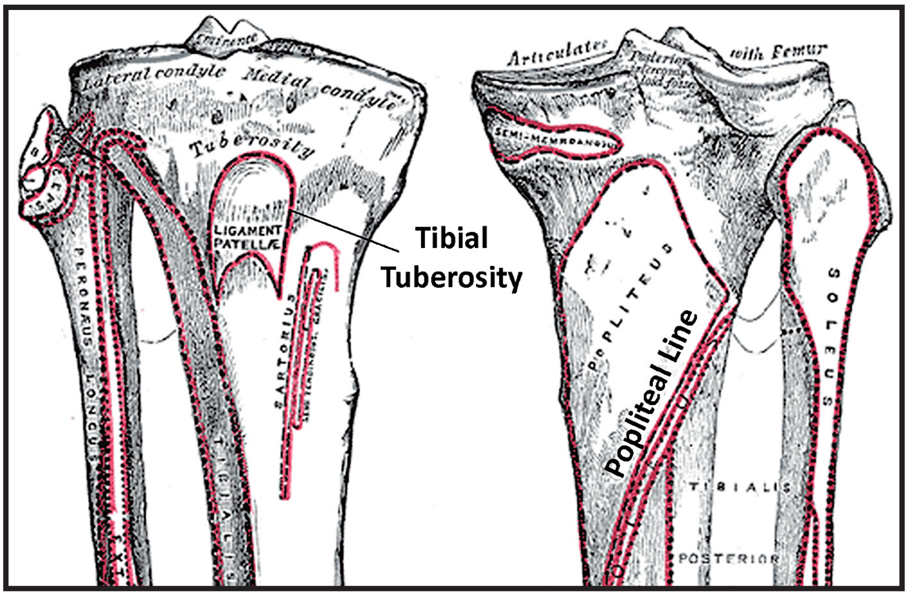


Figure 5.18, Superior Right Tibia. Anterior, Left. Posterior, Right. Attachment Sites Indicated
(Modified from Gray 2000: Fg 258 and 259).

Calcaneus: Achilles (Fg 5.19).

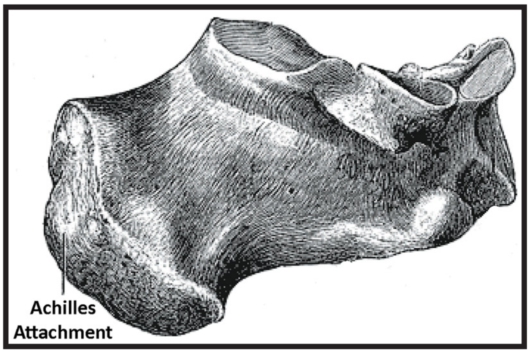


Figure 5.19, Right Calcaneus
with Achilles Attachment Indicated
(Modified from Gray 2000: Fg 267).

5.3.9 Dentition

Teeth hold the potential to convey a great amount of information about the individual in which they were formed. As previously stated, age estimation tends to be more accurate in juveniles when estimated by dental formation (Brickley 2004, Schaefer *et al* 2009). Health and stress in childhood can be seen in disruptions in enamel formation (King *et al* 2005). The types of food consumed can be surmised from caries and calculus formation (Burne and Marquis 2000, Lieverse 1999, Rosan and Lamont 2000). These can also lend information on the level and types of oral care used (Llena-Puy 2006, Mouradian *et al* 2000). In addition, attrition of dental enamel can suggest a coarse (or soft) diet or extramasticatory use of teeth as a tool (Addy and Shellis 2006, Larsen 2015: 288-92, Molnar 2011).

Dentition was entered into Access per individual using the International Numbering System. Methods were modified from Moore and Corbett (1971). The dentition of sub-adults involves moments in which both deciduous and permanent teeth are present. The juvenile recording form included a column for primary dentition and an additional column for any permanent teeth.

Each tooth crypt was inspected for the presence or absence of a tooth and recorded as: Complete, Lost Post-Mortem, Lost Ante-Mortem, Broken Post-Mortem, Root Only, Jaw and Tooth Missing, Congenitally Missing, Not Erupted. Carious lesions were recorded by location and size. Location was recorded as: Occlusal, Inter-Proximal, Smooth Surfaces, Cervical, Root. Size was recorded as: <3, 3-5, 5+mm[1]. Calculus was recorded as present or absent with note taken if it occurred on the occlusal or root surface. Enamel hypoplasia was recorded as present or absent.

Wear was scored using the Scott (1979) method for molars (Fg 5.20) and the Smith (1984) method for the remaining teeth (Fg 5.21).

1 Note—tooth sizes vary, thus some leeway was given to determination of lesion size

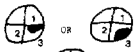
	Score	Description
	0	No information available (tooth not occluding, unerupted, antemortem or postmortem loss, etc.)
	1	Wear facets invisible or very small
	2	Wear facets large, but large cusps still present and surface features (crenulations, noncarious pits) very evident. It is possible to have pinprick size dentine exposures or "dots" which should be ignored. This is a quadrant with *much* enamel.
	3	Any cusp in the quadrant area is rounded rather than being clearly defined as in 2. The cusp is becoming obliterated but is not yet worn flat.
	4	Quadrant area is worn flat (horizontal) but there is no dentine exposure other than a possible pinprick sized "dot."
	5	Quadrant is flat, with dentine exposure one-fourth of quadrant or less. (Be careful not to confuse noncarious pits with dentine exposure.)
	6	Dentine exposure greater: more than one-fourth of quadrant area is involved, but there is still much enamel present. If the quadrant is visualized as having three "sides" (as in the diagram) the dentine patch is still surrounded on all three "sides" by a ring of enamel.
	7	Enamel is found on only two "sides" of the quadrant.
	8	Enamel on only one "side" (usually outer rim) but the enamel is thick to medium on this edge.
	9	Enamel on only one "side" as in 8, but the enamel is very thin—just a strip. Part of the "edge" may be worn through at one or more places.
	10	No enamel on any part of quadrant—dentine exposure complete. Wear is extended below the cervicoenamel junction into the root.

Figure 5.20, The Scott (1979: 214) System of Scoring Wear in Molars.

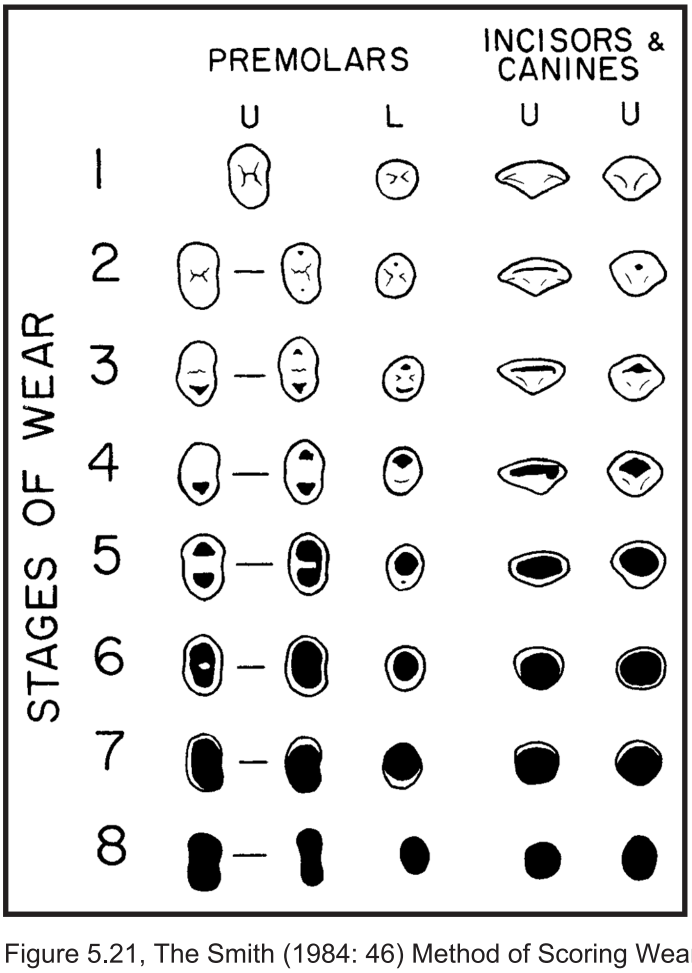
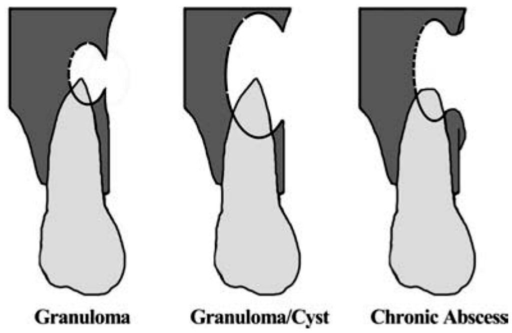


Figure 5.21, The Smith (1984: 46) Method of Scoring Wear.

Periodontal disease was recorded on an ordinal scale of 0-3: zero indicating no disease present, and three indicating severe periodontal bone reaction (Ogden 2008). Abscesses, a hollowed out area of bone with rounded margin, which in life is filled with pus due to infection; and granulomata, a hollowed out area of bone with a sharp margin (should there be one) filled with granulated tissue formed to protect healthy from necrotic tissue, were recorded by location on a presence or absence basis (Fg 5.22).



The basic characteristics of granulomas, granuloma/cysts, and chronic abscesses. The granuloma and the granuloma/cyst are exposed by taphonomic damage beneath a thin, eggshell thickness of bone with a jagged and broken edge. The chronic abscess has a rolled and thickened rim where it penetrates the cortical plate of the alveolus, and the opening is often surrounded by a 'halo' of new bone deposition. The lining is porous for the passage of blood vessels in granulomas and abscesses, but much less so in cysts, which develop a lining membrane

Figure 5.22, Granulomata Compared to Abscesses (Modified from Ogden 2008: 297).

5.3.10 Pathology

A field was created in Access specifically designed for indicators of infectious disease, trauma, metabolic disturbances, congenital conditions, and physical deterioration not already included in the above sections. Entries included location, an area for a description of the bone changes, a differential diagnosis, and links to photographs.

Foundation texts used in analysis include: Resnick and Niwayama (1995); Waldron (2009); Aufderheide and Rodríguez-Martín (1998); Ortner (2003); and Pinhasi and Mays (2007). Other articles and texts were used when needed and are referenced in conjunction with the appropriate pathologies. Investigation included radiographs when deemed necessary and are also given alongside the appropriate pathology.

5.4 Statistical Analysis

Analyses were preformed to compare sex differences. For the sake of sample size and discussion purposes, the probable males and females were combined with the males and females respectively. Comparisons were made between cemetery types separated by the commonly accepted religious and ethnic categories (see Chapter 7).

In all cases, the population was initially divided into age categories to allow for any changes that occur due to the ageing process; however, this did not always allow for statistically viable numbers. In such cases, age was abandoned as a variable.

In addition to age and sex, patterns were investigated in regards to health, disease, and physical stress. Stature, limb and cranial proportions were examined to evaluate population variation. Joint degeneration and entheseal sites were evaluated for signs of both activity and potential genetic variation. Chi^2 tests were used for binomial categorical data; ie: Male-Female. Minitab 17 was used for Hierarchical General Linear Modelling (HGLM) and Discriminant Function Analysis (DFA).

The cranial data was entered into Excel and the MultiBase2015 package used for principle components analysis (PCA) and partial least squares discriminant analysis (PLS-DA). Between 1965 and 1980, Dr. William Howells compiled a set of cranial measurements from populations across the world. Three of these populations were from a European population from a comparable time frame: the Berg from the Rhineland, Zalavar from what is today Hungary, and the Norse from the Viken area of modern Norway (Howells 1995, 1989, 1973). The cranial data from this research was compared to itself and then comparatively to the three populations in the Howells' data.

5.5 Decisions, Problems, and Judgement Calls

This investigation into the early mediaeval burial and bioculture of Scotland is essentially the first of its kind. This brings to the fore a host of complications, not the least of which is tracing *all* the applicable information and trying to bring it into one location. Many mortuary finds occurred in the antiquarian period or in the 'interim' between antiquarian and modern methodology. From the perspective of traceability, this meant that site documentation had been lost, improperly recorded, improperly curated, or simply never existed to begin with. This deficiency in the records was joined by an incomplete and fragmented assemblage due to taphonomy, improper curation, and wholly inaccessible collections. Additionally, the not uncommon technological aggravations, limited funding, and constraints on time necessitated some practical, if sometimes galling, decisions be made.

For example, many of the collections included in this study were only available for a very limited period of time. These include Cnip from Lewis; Birsay Bay, Breckness, The Bu of Cairston, Bustatoun, Gurness, Newark Bay, Pierowall, Scar, and Skaill House from Orkney; Grutness, St. Ninian's Isle, Sandwick from Shetland and one skull from St. Ninian's Point, Bute. Data was taken carefully, but quickly. Any double checking needed to come from the many photographs taken—not the remains themselves—or not double checked at all.

As with many projects, not all the data collected is able to be included in the final product. Missing data precluded many analytical avenues that would otherwise be viable lines of inquiry. For example, investigating identity through body position or cemetery organisation was not possible due do lack of site records. Additionally, as there is still much which is unknown about the aetiology of joint degenerations such as osteophyte and porosity formation, analysis was not performed on the severity of these developments. Use of the recorded scores was abandoned, and Waldron's (2009: 33-4) criteria for osteoarthritis was deemed more informative at this particular juncture (see 8.7).

It is acknowledged that repeated testing may result in type I error. In a study such as this, avenues of exploration are often precisely that: a tool to root out possible lines of further information; not definitive resolutions. Graphs were used to help visualise the data. Trend(fit) lines were given when their use highlighted a pattern in the data and were depicted in the form that seemed to best illustrate that pattern; whether linear, quadratic, best-fit, or other. Other choices are discussed in the sections which correspond to the decisions in question. It is hoped that the data missing from this thesis will be inserted at some future date and the missing analyses can be performed.

5.6 Conclusion

The basic methodology used in this thesis has been given above. More specific information is presented as needed during the presentation of the results. The subsequent chapters detail these results, beginning with the site information. This is followed by the human remains, analysed in light of the site information.

CHAPTER 6

The Research Sites

6.1 Introduction

One of the original goals of this research was to locate sites which dated roughly from the 8th to 13th centuries, within the modern boundaries of Scotland and Cumbria, which yielded human remains. This was to be followed by locating the whereabouts of those remains and then to gain access to any extant collections from the curating institutions. The search was unable to discover a location for remains discovered at many of the identified sites. In addition, some collections with extant curation were not available for analysis.

This chapter gives an account of the sites for which human remains were analysed for this research. These sites are a sampling from across the geographic region of this study: from Cumbria to Shetland. Figure 6.1 presents the overall territory covered. Although there are obvious gaps in geography, the broad geographic differential should allow for a sufficient sample to represent the general population. For a more in-depth view of the various areas and sites, see the regional sections below.

A few individuals reveal radiocarbon dates outside the 8th to 13th century time-frame. These individuals held the potential to provide a comparative reference for the remaining data and therefore, they were included, rather than excluded, from the analysis.

It is important to note that documentation for the sites that follow ranged from detailed and informative to non-existent. The information given below is as comprehensive as the available information would allow.

Figure 6.1, The Study Area in its Environs (Modified from Here 2015).

6.2 Shetland

The Shetland Islands (Fg 6.2) lie on the 60th parallel, about 355 kilometres (220 miles) from Bergen, Norway and 215 kilometres (130 miles) from Thurso, Scotland (MapCrow nd). The Shetland Archipelago is the most northern part of modern Britain. The climate is oceanic, but sub-polar, and therefore the growing season is very short and the weather can be very wet (McMillan

Figure 6.2, The Shetland Islands with Research Sites Indicated (Modified from Here 2015).

2008, Turner 2003). The landscape is rocky and hilly. Though soils vary, a layer of peat generally covers the islands. Runoff and erosion generally elicit soil strata that are too shallow for agricultural planting (Adderley *et al* 2000, Everett 1976). Extensive working of the soil is necessary to make a medium that is viable for food production. There is a folk saying that ‘Shetlanders are fishermen with farms,’[1] meaning that most of the food economy on the islands is in the form of fishing, with farming done to supplement, should the weather permit.

There is an ongoing debate concerning the human presence on the Archipelago in the early mediaeval period. Evidence for Pictish usage diminishes by the 7th century (Tucker 2003). By the mid-9th century, Norse settlers from what is now Scandinavia had settled on the islands. One theory suggests that the islands were essentially abandoned by the ‘Picts’ and that the Norse arrived to an open land (Kendrick 2004). However, ecclesiastical settlements are evident in the Norse place names of sites such as Papa Stour (ON *Papey Stjora* or Priest’s Island) and Papa Geo (ON *Papey Gjó* or Priest Gully) (Zoëga 1910). This suggests that Shetland had some inhabitants, if only those seeking a Christian enclave.

A more popular view, at least until recently, is that the ‘Vikings’ arrived and either killed all the Shetland natives or sold them into slavery (Crawford 1981, Grydehøj 2011, Smith 2001). This theory has been fuelled by the popular image of the ‘berserk viking marauder’ killing everything in his path (Wawn 2002). A third theory of the settlement of Shetland by the Norse is that the settlement was generally peaceful and it was a shift in power, not necessarily populace, which caused the cultural change in Shetland (Ritchie 1974). Again, how the shift from Pict to Norse occurred is still under debate. Shetland did, however, come into the control of Norse settlers, and by the

1 The full saying: ‘Shetlanders are fishermen with farms; Orcadians are farmers with boats.’

end of the 12th century, the islands were placed under the direct rule of the Norwegian crown (Anderson *et al* 1873, Jónsson and Gundersen 1967). The Islands would remain attached to Norway until the mid-15th century when both the Shetland and Orkney Isles were used as bond for the dowry of Margaret of Norway to James III of Scotland (Crawford 1987, Graham-Campbell and Batey 1998, Ritchie 1993).

6.2.1 Grutness

Site Number: HU40NW 2

Curating Institution: Shetland Museums

Number of Individuals: 1

Age of Individual: Mature Adult

Sex of Individual: Probable Male

Sumburgh Head is at the southern end of Shetland (Fg 6.3). It is connected to the Mainland by a brae (ON *breiðeið* meaning wide isthmus).

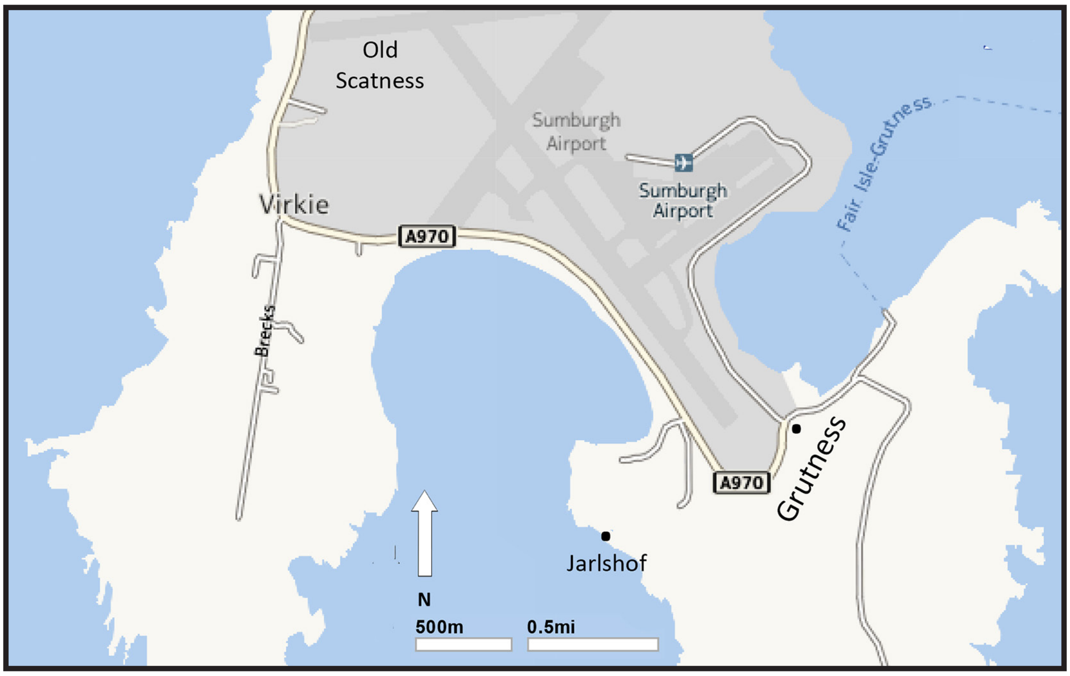


Figure 6.3, Location of Grutness on Sumburgh Head, Shetland Mainland (Modified from Here 2015).

Arguably the most famous site on Shetland, Jarlshof, lies on the north-western promontory of Sumburgh Head (Hamilton 1956). This is a multi-period site with evidence of habitation from the 3rd millennium BC to the 17th century AD; this includes evidence from the 8th to 13th centuries.

The Shetland airport is situated along the isthmus extending over 1600 metres to the north. Construction of the airport, along with continued expansion and renovation, has lead to further archaeological discoveries. On the north-western end of the airport lies Scatness; discovered during road construction. This is also a multi period site spanning the 1st millennium AD (Dockrill *et al* 2009, RCAHMS 2016). Jarlshoff and Scatness both exhibit 'Norse' style buildings and artefacts. In addition, while constructing the construction of the airport control tower during the Second World War, a 'Viking' grave containing a broken sword and scabbard, a small cooking pot, and a portion of a human skull was discovered (RCAHMS 2016).

In 1982, the Shetland Islands Council began sand extraction of the area immediately south of the Sumburgh Airport; about 500 metres east of Jarlshof. The work uncovered a wall, parts of a human skeleton and associated midden material (Fg 6.4, RCAHMS 2016, Smith and Moran 1982, Shetland Museums, Pers Comm). Moran suggests that the wall was mediaeval and both authors

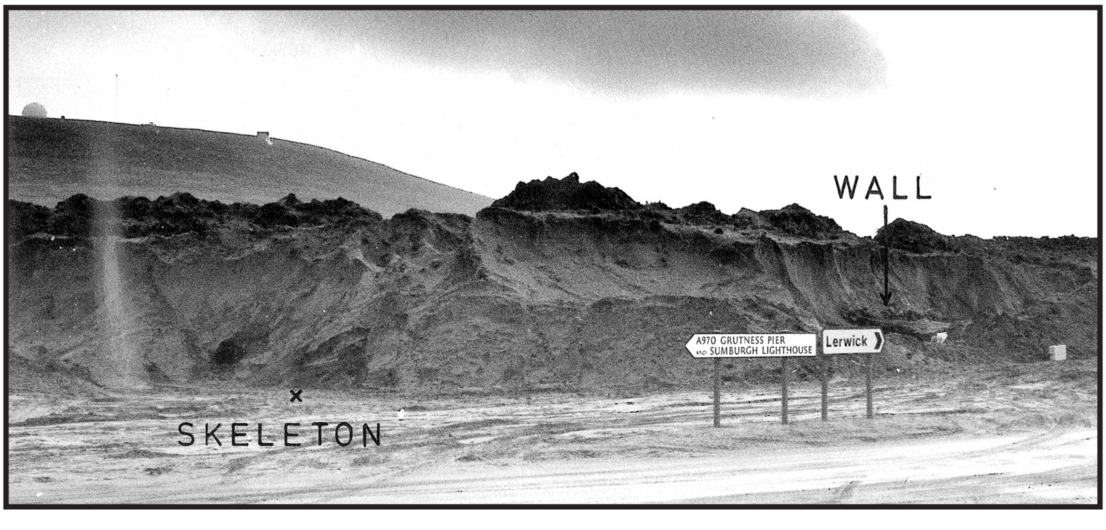


Figure 6.4, Location of the Finds at Grutness (Smith and Moran 1982: 10).

suggest it is the remainder of a robbed-out croft (Smith and Moran 1982). The wall was as much as 0.5 metre bowed. Bowed walls are a common feature of many Norse house styles (Skov 2002). Therefore, it is possible this is a remnant of a Norse longhouse.

The skeletal material was discovered during sand extraction and brought to the excavators with little context information (Smith and Moran 1982). The individual was found with a small piece of light coloured wood attached to his cranial vault. A mediaeval tile was discovered in association with his pelvis; although the precise association is not known. No radiocarbon date or further context is available for these remains.

6.2.2 St. Ninian's Isle

Site Number: HU32SE 4

Curating Institution: Shetland Museums (12 Individuals),
Marischal Museum (3 Individuals)

Number of Individuals: 15; Total Population Undetermined

Age and Sex of Individuals: See Table 6.1

Individual	Age	Sex
Hubert	Male	Mature Adult
Robert	Old Child	Probable Male
Rosemary	Young Middle Adult	Male
SK1	Neonate	Indeterminate
SK2	Young Middle Adult	Female
SK3	Early Adult	Male
SK5	Young Middle Adult	Male
SK7	Young Child	Indeterminate

Individual	Age	Sex
SK8	Neonate	Indeterminate
SK9	Young Child	Indeterminate
SK11	Neonate	Indeterminate
SK12	Neonate	Indeterminate
SK13	Neonate	Indeterminate
TT1 25 65a	Adult	Indeterminate
TT1 61 24	Adult	Indeterminate

Table 6.1, Individuals from St. Ninian's Isle Available to this Research.
Age and Sex are Those Estimated by this Researcher.

St. Ninian's Isle lies off the southeastern coast of the Shetland Mainland (Fg 6.5). It is connected to the Mainland by a tombolo. There is a strong local tradition of the island having been taken by Ninian as a Christian enclave (Small *et al* 1973). Saint Ninian is said to be the bringer of Christianity to the

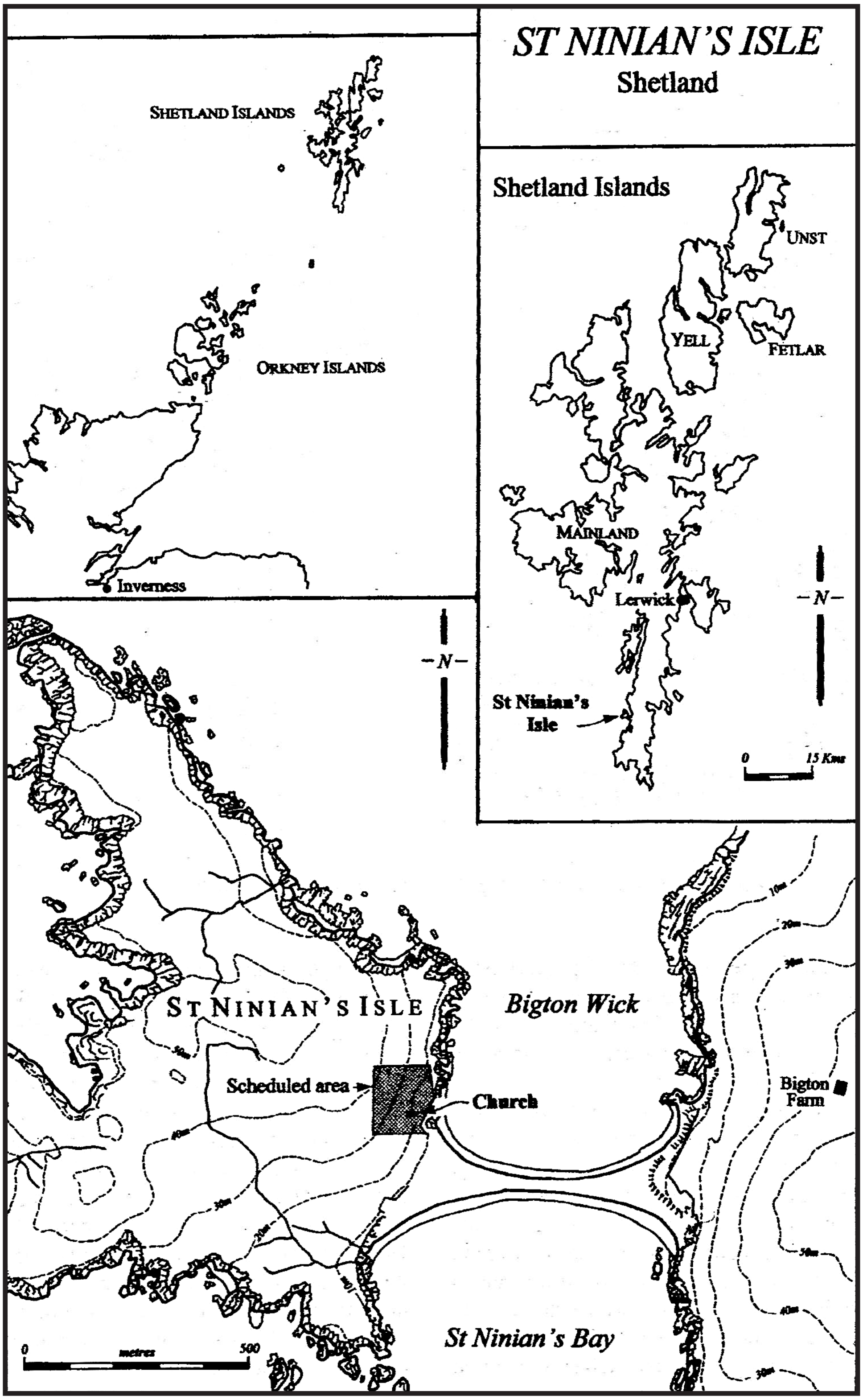


Figure 6.5, The Location of St. Ninian's Isle and the Excavation Site (Barrowman 2003: 52).

Southern Picts during the 4th or 5th century (Clancy 2001, Fraser 2002). There is, however, no documentary record of any religious buildings or settlement on the isle until the 16th century, when the abbey was abandoned during the Reformation (RCAHMS 2016, Small *et al* 1973).

Local tradition gave the approximate area where the early mediaeval church had stood, and a cemetery was in use in that portion of the island until the mid-19th century (Barrowman 2003, Small *et al* 1973). In 1955, excavations began to discover the mediaeval church and establish the primary date of construction (Small *et al* 1973). A suggestion of 11-12th centuries was given; although, it is unclear how certain this date is (Barrowman 2011: 44).

A hoard of silverware in a larch box was discovered during this excavation under a cross-marked slab in the floor of the mediaeval church (O'Dell *et al* 1959, RCAHMS 2016, Small *et al* 1973). During the excavation, many burials were also discovered (Fg 6.6); however, the excavators believed

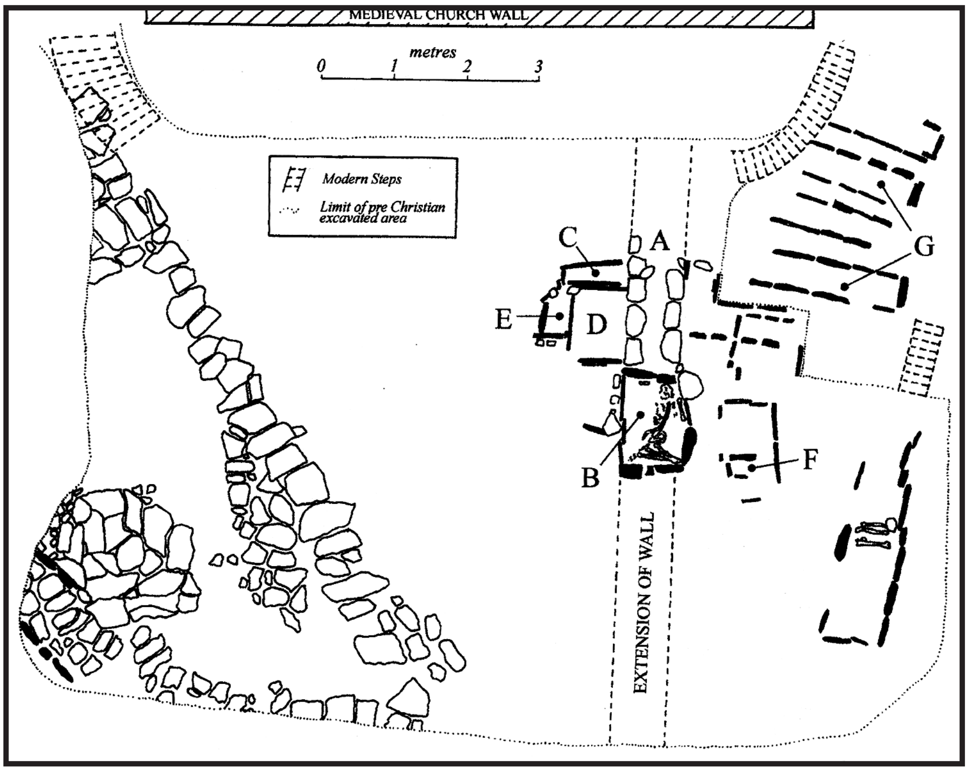


Figure 6.6, Plan of Original St. Ninian's Excavation Area by O'Dell
(After Barrowman 2011: 3; O'Dell *et al* 1959).

that a stratification sequence was impossible. The graves were relocated to another part of the site without recording the number of individuals, any context for their burial, nor to where they were relocated (Small *et al* 1973). Personal journal entries did record the discovery of two short cists which included quartz pebbles, cremations, and two broken urns. Notes from the structural recording reveal the discovery of two further cists, along with rough sketches of 'box-like' structures which Small *et al* (1973) suggesting were further burials. Sketches also suggest at least six crouched inhumations stratigraphically later than the Iron Age structures, and long-cisted inhumations about three feet above the short cist cremations.

Four skeletons were lifted for examination. These individuals were given the 'code' names 'Hubert', 'Robert', 'Rosemary', and 'Elizabeth' (Barrowman 2011, University of Aberdeen 2003a, 2003b, 2003c). The Marischal Museum records 'Hubert' as having been 'extended in a cist' (University of Aberdeen 2003a). 'Robert' lay extended in a wooden coffin surrounded by a cist (University of Aberdeen 2003b). 'Rosemary' was prone with legs flexed in a short cist that had been inserted into a wall (University of Aberdeen 2003c). It is unclear what the grave environment was like for 'Elizabeth'. No grave goods were mentioned in association with the graves. The four individuals were sent to the Marischal in Aberdeen for curation. Unfortunately, Elizabeth never arrived and has yet to be located (Barrowman 2011, Small *et al* 1973).

A new excavation was begun in 1999 to redress the archaeology of the site which had been overshadowed by the discovery of the Treasure (Barrowman 2011, 2003). The new excavation encompassed and expanded the area to the south of the chapel, previously excavated in 1958-9. A further 13 individuals were revealed, eight of which were juveniles age three or younger. Two of the burials were deposited directly into an earthen grave, neonate 6 and young child 7; however, remnants of head boxes were evident

(Barrowman 2011, 2003). Both were oriented north-northwest to south-southeast. Adult burial 3 was also deposited in a plain earthen grave, oriented east-west with the head at the west (Barrowman 2011). The remaining burials were east-west aligned cist graves.

Grave goods were minimal (Barrowman 2011, 2003). Neonate 12, had a flattened beach pebble in its mouth. Young child 9 had a limpet shell in its mouth and a hexagonal flattened stone was lying next to the skeleton. Six of the juvenile burials, 8-13, were discovered one next to another with signs of a stone cairn (or cairns) having been above them. Three of the neonate graves, 10, 11, and 13, had stone headstones with incised crosses.

Adult individual 5 (Section 8.13.3) was discovered in a short cist. An iron knife lay next to the body (Barrowman 2011). The body had been deposited in at least two pieces. The upper body was placed in the grave in the opposite direction of the lower. Several sharp-force trauma wounds were also present on the skull, neck and lower leg.

Radiocarbon dates from nine of the individuals place the graves in the 8th to 12th century range (Figure 6.7), with the children's graves on the earlier end of that spectrum (Barrowman 2011, 2003, RCAHMS 2016).

Sample code	Radiocarbon lab. code	Description	Uncalibrated Years BP	Calibrated 2-sigma
SK 5	AA-45624	Burial into an earlier short cist, alighned E–W	895±45	AD 1025-1220
SK 6	AA-45625	Infant burial, possibly once accompanied by a cist, aligned N–S	940±45	AD 1015–1210
SK 8	AA-45627	Infant burial	1155±45	AD 730–990
SK 9	AA-45628	Infant burial	1180±45	AD 705–975
SK 10	AA-45629	Infant burial	1045±40	AD 890–1120
SK 11	AA-45630	Infant burial	1020±45	AD 895–1155
SK 12	AA-45631	Infant burial	1060±45	AD 880–1120
SK 13	AA-45632	Below low compartmentalised cairn, aligned E–W, cuts SK 12	1150±45	AD 770–990
'Robert'	SUERC-5441	Long cist aligned E–W	1125±35	AD 780–995
SK 7	AA-45626	Unaccompanied juvenile burial with a head box/cist aligned NW–SE	1250±45	AD 670–880
'Hubert'	SUERC-5440	Burial in early E–W long cist	1245±35	AD 680–875
'Rosemary'	SUERC-5442	Burial in a short cist aligned N–S. Stratigraphically and typologically earlier than 'Hubert'	1305±35	AD 655–775

Figure 6.7, Radiocarbon Dates from St. Ninian's Isle (Modified from Barrowman 2011: 174).

6.2.3 Sandwick

<u>Site Number</u>: HP60SW 9

<u>Curating Institution</u>: Shetland Museums

<u>Number of Individuals</u>: 1

<u>Age of Individual</u>: Mature Adult

<u>Sex of Individual</u>: Probable Female

Unst is the most northern of the Shetlands[2]. It holds the highest density of known rural Viking Age sites in the world: over 60 longhouses (The Shetland Amenity Trust 2014). Coastal erosion has revealed Norse structures on the shore of Sandwick Bay (Fg 6.8), on the southwestern side of Unst. Over time, early mediaeval and Norse period objects have been discovered in the sand: pottery sherds, whetstones, whorls, bone combs and pins (RCAHMS 2016).

A suspected longhouse was excavated in 1978-80, during which two square kerbed burial cairns were discovered (Fg 6.9, Bigelow 1984). Only one of the cairns included human remains. The other appeared to have never held a grave. The cairn with human remains had been created by hollowing out approximately five metres by five metres into the soil. The body had been laid prone in a northeast-southwest alignment, covered over with sand, and then fist-sized pebbles. The pebbles were relatively flat with the original ground surface. The grave was then lined with a stone kerbing. No grave goods were discovered. A radiocarbon date of 257-782 Cal AD, 2σ (GU 1291) was obtained for the burial (RCAHMS 2016). It is this individual who was available for analysis.

Local lore also maintains that crouched burials have occasionally eroded

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2 Ootsta (Out Stack) lies 1.8 miles (2.9 km) north of Unst; however, it is little more than a sea stack and there is debate as to referring to Ootsta as an island. Muckle Fluga and the Holm of Skaw are small islets just to the north of Unst.

Figure 6.8, Location of the Graves in Sandwick Bay (Author’s Image after Here 2015).

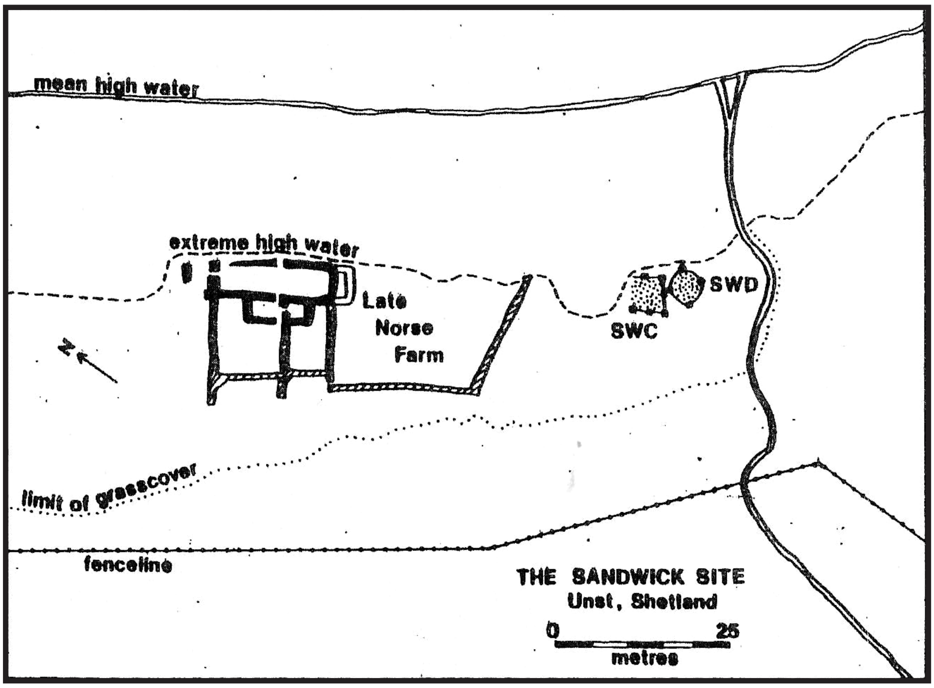

Figure 6.9, The Kerbed Cairns and Norse Excavation in Sandwick Bay (Bigelow 1984: 116).

from the sand in the area (Bigelow 1984, RCAHMS 2016). In 2005, an additional inhumation was discovered in a rescue excavation of an eroding mound, revealed as an early mediaeval building (HP60SW 66, RCAHMS 2016, The Scape Trust 2008). The inhumation lay extended with a polished stone disc, a small copper-alloy ornament, and a steatite bead. Radiocarbon dating places this inhumation at 130–390 Cal AD, 2σ (SUERC-10745, RCAHMS 2016).

6.3 Orkney

The Orkney Islands are an archipelago which lies on the 59th parallel (Fg 6.10).

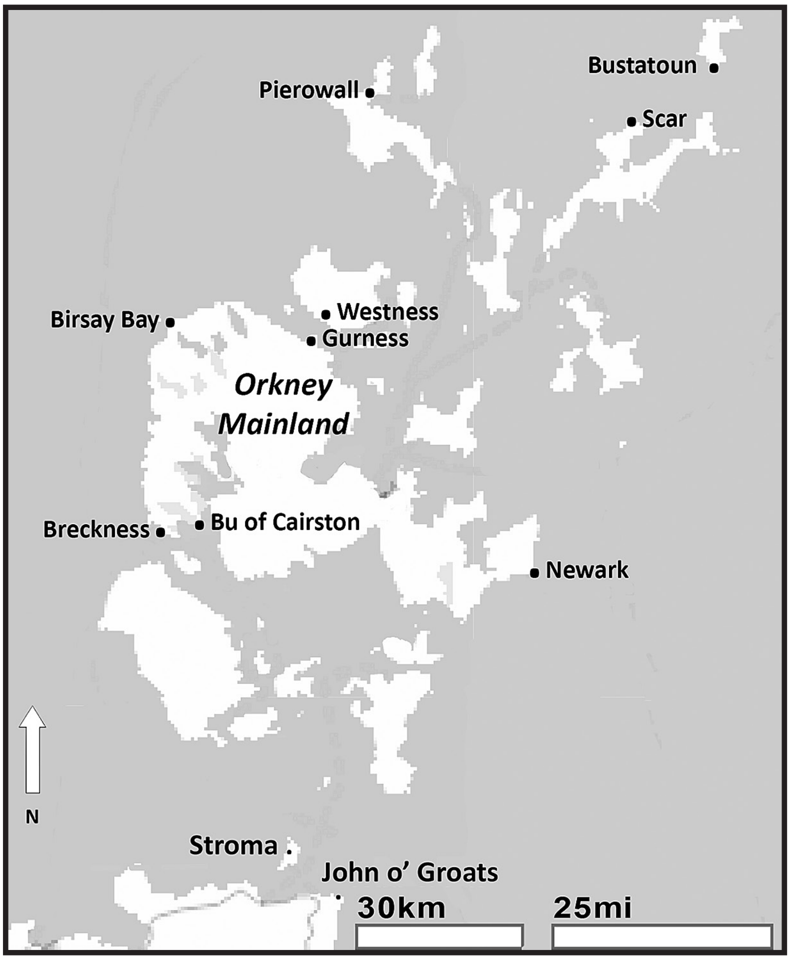

Figure 6.10, The Orkney Islands with Research Sites Indicated (Modified from Here 2015).

Skeletal collections from nine sites were available for this research. The most southern of the islands, Stroma, can be seen from John o' Groats on the Scottish Mainland. The climate is oceanic and mild (Chalmers 2003). Except for some sharply rising hills on the Mainland, Hoy, and Rousay, the islands are mainly flat or rolling; although, in some areas, the shore can lie far below rugged cliffs (Brown 2003). Wind and water erosion can destroy the topsoil, yet agricultural cultivation is possible and is one of the main economic forces on the modern economy (Chalmers 2003, Thompson 2003).

In many ways, the history of Orkney and Shetland are linked. Like Shetland, the human presence in the early mediaeval period is still under debate. There is greater documentary evidence from Orkney, most in the way of later Norse and Icelandic writings (11-15th centuries). There is also more archaeological evidence available from Orkney, probably as a result of the different soil composition; although, other factors could certainly be in operation.

As with Shetland, there is an 'abandonment' of the archaeologically significant Pictish sites by the 7-8th centuries. Then, by the mid 9th century, 'Scandinavians' had settled on the islands, and, like Shetland, the manner of settlement is also under controversy (Smith 2001). Unlike Shetland, Orkney became a known seat of viking power which eventually became an Earldom (Crawford 2013). The Orkney Earldom maintained some form of autonomy from crown rule, while Shetland came under the full control of the Norwegian crown in 1195 (Anderson *et al* 1873, Crawford 2013, Jónsson and Gundersen 1967). Also like Shetland, the Orkneys were used as bond for the dowry of Margaret of Norway to James III of Scotland in the 15th century (Crawford 1987, Graham-Campbell and Batey 1998, Ritchie 1993).

6.3.1 Bustatoun

Site Number: HY75SE 2 & 3

Curating Institution: Orkney Museums

Number of Individuals: 3

Age and Sex of Individuals: See Table 6.2

Individual	Age	Sex
1	Mature Adult	Probable Male
2	Young Middle Adult	Female
3	Early Adult	Male

Table 6.2, Individuals from Bustatoun Available to this Research.
Age and Sex are Those Estimated by this Researcher.

Archaeological Bustatoun lies at the south of Orkney's most northern island, North Ronaldsay, on the Point of Burrian (Fg 6.11), the modern hamlet lying just to the north. Bu sites are particularly eminent in early mediaeval Orkney (Gibbon 2007, Stevens *et al* 2005). They are a similar concept to the

Figure 6.11, Bustatoun and the Point of Burrian (Modified from Here 2015).

post-mediaeval landed estates, and once Christianity was common, included chapels. If Bustatoun can be parsed as ON: *bú staðr tún*, or 'elite site-enclosed-farmstead' (Gordon 1981, Zoëga 1910), this would suggest that a much more elaborate site may exist beneath the modern soil surface.

A formal excavation has not been undertaken; however, erosion and amateur digging do suggest a larger complex. On the east side of the Point of Burrian lie the remains of an Iron Age broch (Fg 6.12, Lorimer nd, RCAHMS 2016). To the west is what is suspected to be a Viking Age settlement.

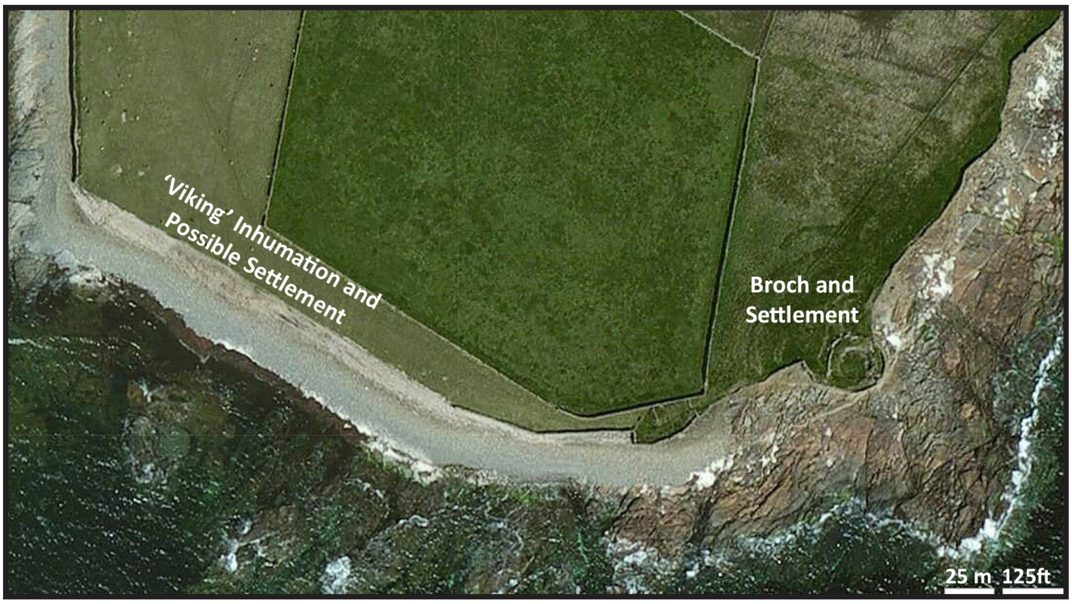

Figure 6.12, The Southern End of the Point of Burrian with Archaeological Features Indicated (Modified from Here 2015).

During the Second World War, a 'Viking' grave was discovered protruding from the cliff wall between the broch and the settlement (RCAHMS 2016). The grave included 'a skull and other objects, including a Celtic-type (penannular) brooch' and a 'whorl or ring of vitreous material' (RCAHMS 2016, Lorimer nd).

An additional, rescue excavation, was undertaken in the late 1980s; however, this was never published and only a few pages of notes remain from the project (Orkney Museums, Pers Comm). The notes indicate that quite a bit of disarticulated human bone was found during the excavation; however, at least one disturbed but relatively articulated male skeleton was discovered in the early mediaeval layers (Lorimer nd). This grave may have included a glass linen smoother, which is commonly thought to be a part of the Norse, female grave set. Unfortunately, further information was absent.

Three individuals were presented to this researcher for analysis. The specific circumstances surrounding the find were not available. No further information was given beyond the remains being within the correct time period (Orkney Museums, Pers Comm).

6.3.2 Scar

Site Number: HY64NE 7

Curating Institution: Orkney Museums

Number of Individuals: 3

Age and Sex of Individuals: See Table 6.3

Individual	Age	Sex
133	Mature Adult	Female
134	Middle Adult	Male
135	Old Child	Indeterminate

Table 6.3, Individuals from Scar Available to this Research.
Age and Sex are Those Estimated by this Researcher.

Scar is a farmstead lying on the northwest side of the Burness peninsula of the isle of Sanday, Orkney (Fg 6.13). Sanday itself seems to have been an extremely productive area to grow barley during the Norse control of the island (Owen and Dalland 1999: 5). The island was the highest taxed at that time, and this suggests that individuals living on Sanday may have been quite wealthy.

In 1985, coastal erosion revealed some bones and an object on the shoreline just to the north of the farmhouse (Owen and Dalland 1999).

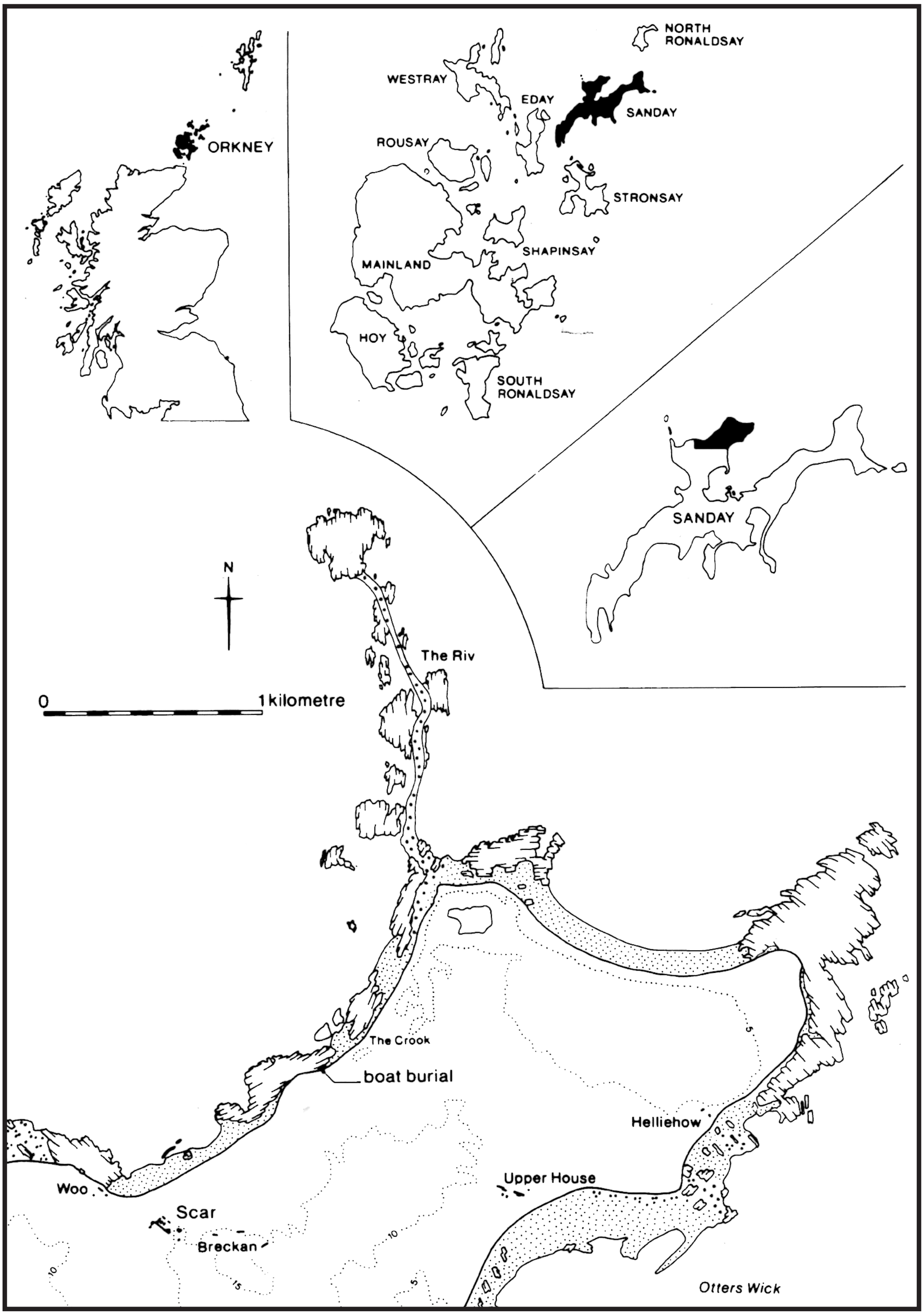

Figure 6.13, The Location of the Scar Burial (Modified from Owen and Dalland 1999: 4).

However, it was not until 1991 that the importance of the site was suspected, when the object was revealed to be a viking lead bullion weight.

Excavation revealed a Viking Age boat burial (Fg 6.14) which included three individuals who had been interred with a compliment of furnishings (Fgs 6.15-16). The northwestern side of the boat, as well as a portion of the grave interior, had already been taken by the sea. The burial contained two adults and a juvenile. The boat was approximately seven metres long and had been aligned in an east-west direction (Owen and Dalland 1999, Müller-Wille 2007).

Uncalibrated radiocarbon dates from Scar

Lab. no	Sample	Years BP	^{13}C measurement
AA-1259/5	Find no 135, Juvenile	940 ± 75	-21.1 ppm
AA-1259/6	Find no 134, Male	1040 ± 60	-21.1 ppm
AA-1259/7	Find no 133, Female	1155 ± 60	-21.6 ppm

Calibrated radiocarbon dates from Scar

Lab. no	Sample	1 sigma range	2 sigma range
AA-1259/5	Find no 135, Juvenile	AD 995 - 1150	AD 970 - 1260
AA-1259/6	Find no 134, Male	AD 960 - 1040	AD 880 - 1130
AA-1259/7	Find no 133, Female	AD 825 - 965	AD 730 - 1020
Combined date of the skeletons		AD 965 - 1025	AD 895 - 1030

Figure 6.14, Radiocarbon Dates from Scar (Modified from Owen and Dalland 1999: 162).

The individuals had been placed in the western side of the boat, and the eastern half filled with large stones. A flagstone was placed in the centre as a divider. One individual was placed parallel to the boat's axis at the farthest point west (Owen and Dalland 1999, RCAHMS 2016). He lay supine with legs flexed and arms folded. At the right side was a sword, broken prior to burial, set in a wooden scabbard and a quiver of arrows (Owen 2004). Between the

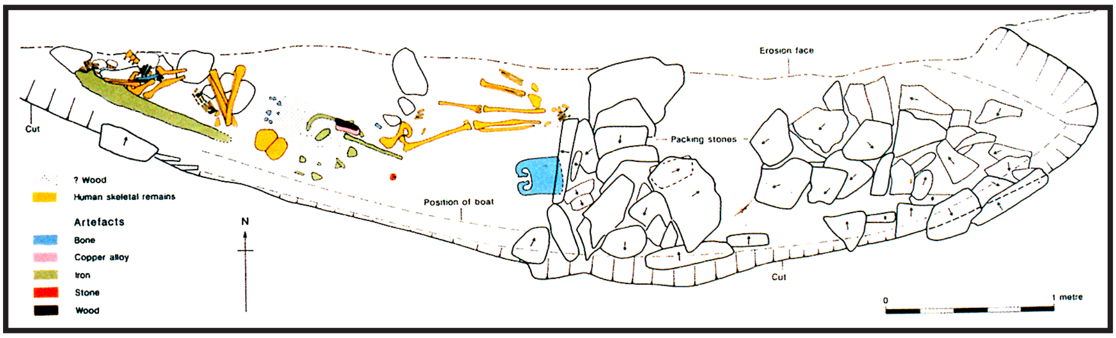

Figure 6.15, Plan of the Scar Burial (Owen and Dalland 1999: 30).

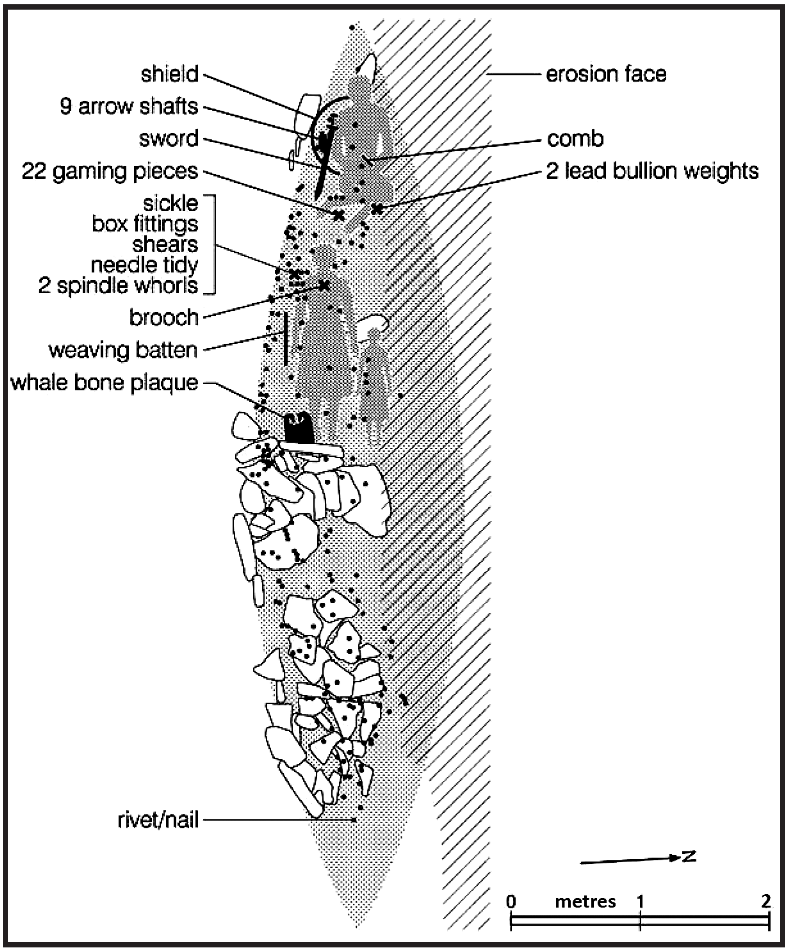

Figure 6.16, Artist's Reconstruction of the Scar Burial (Müller-Wille 2007: 290).

hands was a comb made from bone and antler. A group of 22 bone or antler gaming pieces had been placed at the feet (Müller-Wille 2007, Owen and Dalland 1999).

The additional adult (female) and the juvenile lay next to one another, supine, along the axis of the keel (Owen and Dalland 1999, RCAHMS 2016). Next to the adult were two spindle whorls, a comb, a sickle, a weaving sword, and a pair of shears. The sand next to the boat revealed two lead weights, suggesting that there may have been a scale in the assemblage prior to the erosive process (Owen and Dalland 1999, RCAHMS 2016). In the thorax was a needle and an equal-armed brooch made of gilded bronze and decorated with Borre style gripping beasts (Fg 6.17, Müller-Wille 2007, Owen and Dalland 1999, RCAHMS 2016).

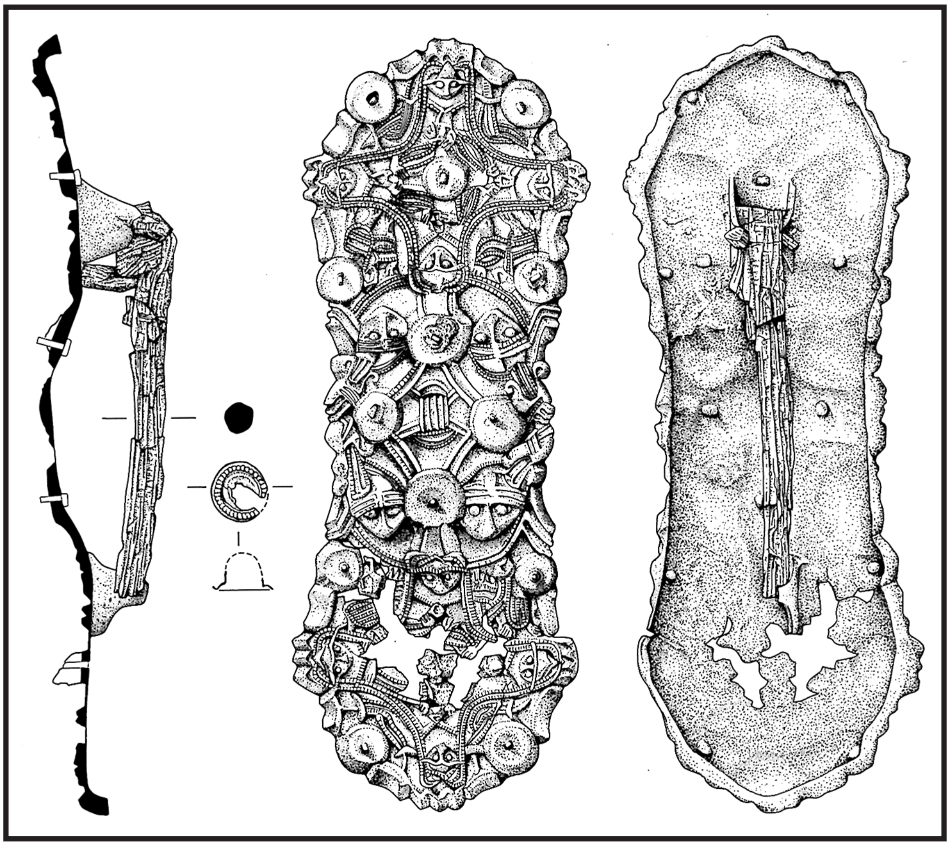

Figure 6.17, Artist Rendering of the Scar Brooch (Modified from Owen and Dalland 1999: 62).

Dating of the brooch style places it at the early end of the 9th century. This particular type of brooch has come to be known as a Troms-type after Norwegian scholar Jan Petersen determined that these brooches were mostly found in the far north of Norway, at least half the known pieces of his time coming from the Troms district (Petersen 1928). As such, Petersen determined that these brooches were also manufactured in the region (Petersen 1928, Owen and Dalland 1999).

However, subsequent to Petersen's typology and determination of manufacturing origins, no further Troms-type brooches have been discovered in Norway, nor has any manufacturing evidence been found (Owen and Dalland 1999). There are, however, three Troms-type broochs that have been discovered in Sweden: two in Småland and one in Uppland. A clay mould for manufacturing these brooches has also been discovered at Birka, Sweden

(Ambrosiani and Clarke 1992, Owen and Dalland 1999).

Near the east end of the chamber was a ‘dragon headed’ whalebone plaque (Fg 6.18). The plaque was made from a whale’s rib (Owen and Dalland 1999). It is 26.6 cm high by 21cm wide (at the base). These were used for smoothing out linen in a similar manner as ironing clothing today. Approximately 60 of these plaques are known throughout the viking world and they are rarely found in such good condition (Owen and Dalland 1999: 80).

The heaviest concentration of plaque finds also come from the Troms region; although, they are found across the viking world. No known isotope studies have been completed on the individuals to verify or disprove their

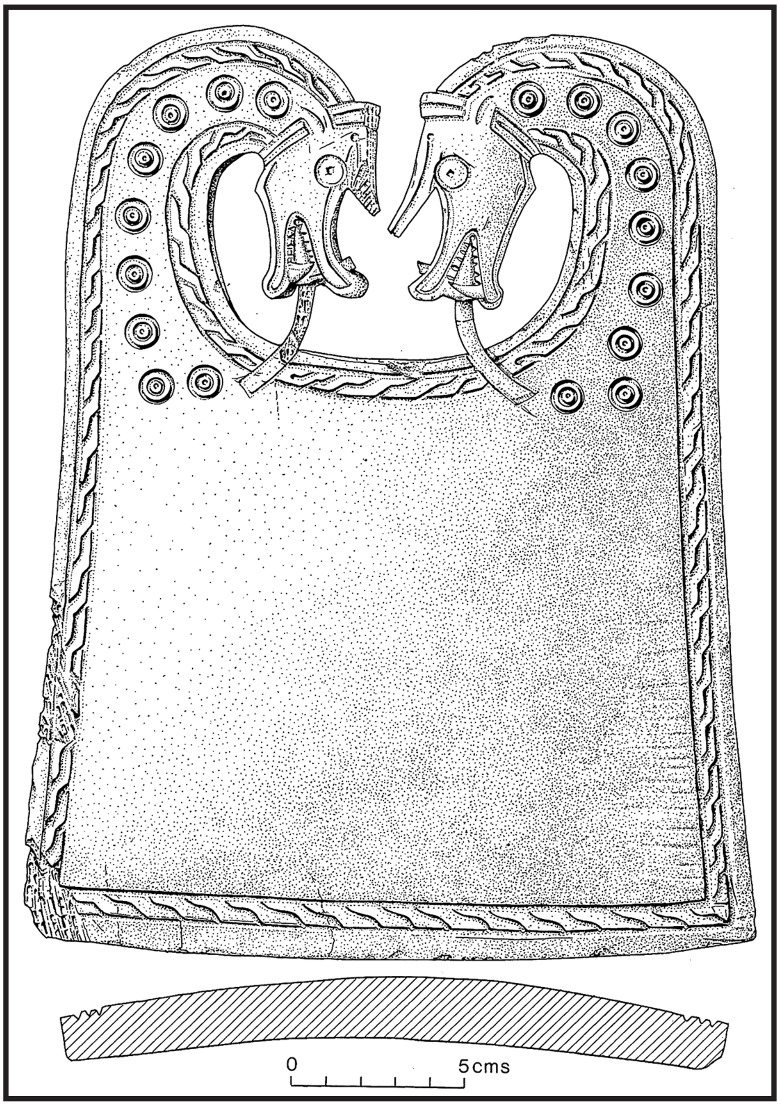

Figure 6.18, Artist Rendering of the Scar Plaque (Modified from Owen and Dalland 1999: 66).

native origin. Typological dating places the plaque also in the early part of the 9th century (Owen and Dalland 1999: 84-6). In light of the radiocarbon dates, it is possible that the items were old at the time of inclusion in the burial.

6.3.3 Pierowall

Site Number: HY44NW 13

Curating Institution: Orkney Museums

Number of Individuals: 1

Age of Individual: Adult

Sex of Individual: Probable Male

The Pierowall Links lie on the northern cape of Westray (Fg 6.19). This area of shifting sand has consumed as much as four square kilometres prior to modern cultivation methods halting its progress (RCAHMS 2016).

Figure 6.19, The Site of Pierowall Links on Westray (Modified from Here 2015).

In 1839, portions of 'Viking' graves were revealed by erosion and an antiquarian excavation was undertaken in April and May of that year. Further excavations were to take place off and on until 1863 by at least three different people (Thorsteinsson 1968). Recording of the excavations was minimal and there is little information about the archaeological context. Seventeen inhumations were uncovered and grave goods included swords, spearheads, shield bosses, axes, sickles, spindle whorls, beads, pins, oval brooches, and combs. Two graves are reported to have had a horse skeleton as a part of the grave furnishings. Clench nails were reported in the graves as well; although, without context it is impossible to determine if these are from a boat, chest, or some other wooden structure (RCAHMS 2016, Thorsteinsson 1968).

One individual from Pierowall was available for analysis. Provenance was given solely as 'mediaeval' (Orkney Museums, Pers Comm).

6.3.4 Westness

Site Number: HY32NE 44

Curating Institution: National Museums Scotland

Number of Individuals: 32 Reported, 30 Analysed

Age and Sex of Individuals: See Table 6.4

Indiv	Age	Sex	Indiv	Age	Sex
5	Mature Adult	Female	21	Adult	Prob Male
6	Middle Adult	Prob Female	24	Middle Adult	Female
7	Mature Adult	Prob Female	25	Middle Child	Indeterminate
8	Mature Adult	Prob Female	26	Adolescent	Prob Female
9	Adult	Prob Male	28A	Early Adult	Prob Female
10	Young Middle Adult	Female	28B	5 Foetal Months	Indeterminate
11	Mature Adult	Male	2(1)	Adult	Prob Male
12	Young Middle Adult	Male	2(2)	Middle Adult	Indeterminate
13	Infant	Indeterminate	30	Middle Adult	Prob Female
14	Adult	Prob Female	32	Mature Adult	Female
15	Mature Adult	Prob Male	34	Mature Adult	Male
17	Infant	Indeterminate	36	Adult	Indeterminate
18	Adult	Prob Female	A	Mature Adult	Female
19	Infant	Indeterminate	B	Middle Adult	Female
20	Middle Adult	Male	Naust	Middle Adult	Male

Table 6.4, Individuals from Westness Available to this Research.
Age and Sex are Those Estimated by this Researcher.

In 1963, the owners of Westness Farm, on Rousay (Fg 6.20), dug a grave to bury a cow and discovered the inhumation of a woman and an infant (Kaland 1993, RCAHMS 2016, Sellevold 1999). Later investigation of the skeletal remains indicated two adult females and an infant. Grave goods included a pair of oval brooches; a gilt silver ringed pin with gold filigree and amber inlay; beads (possibly from a necklace); two wool combs; bronze straps and a bronze bowl. Nothing is known about the grave environment.

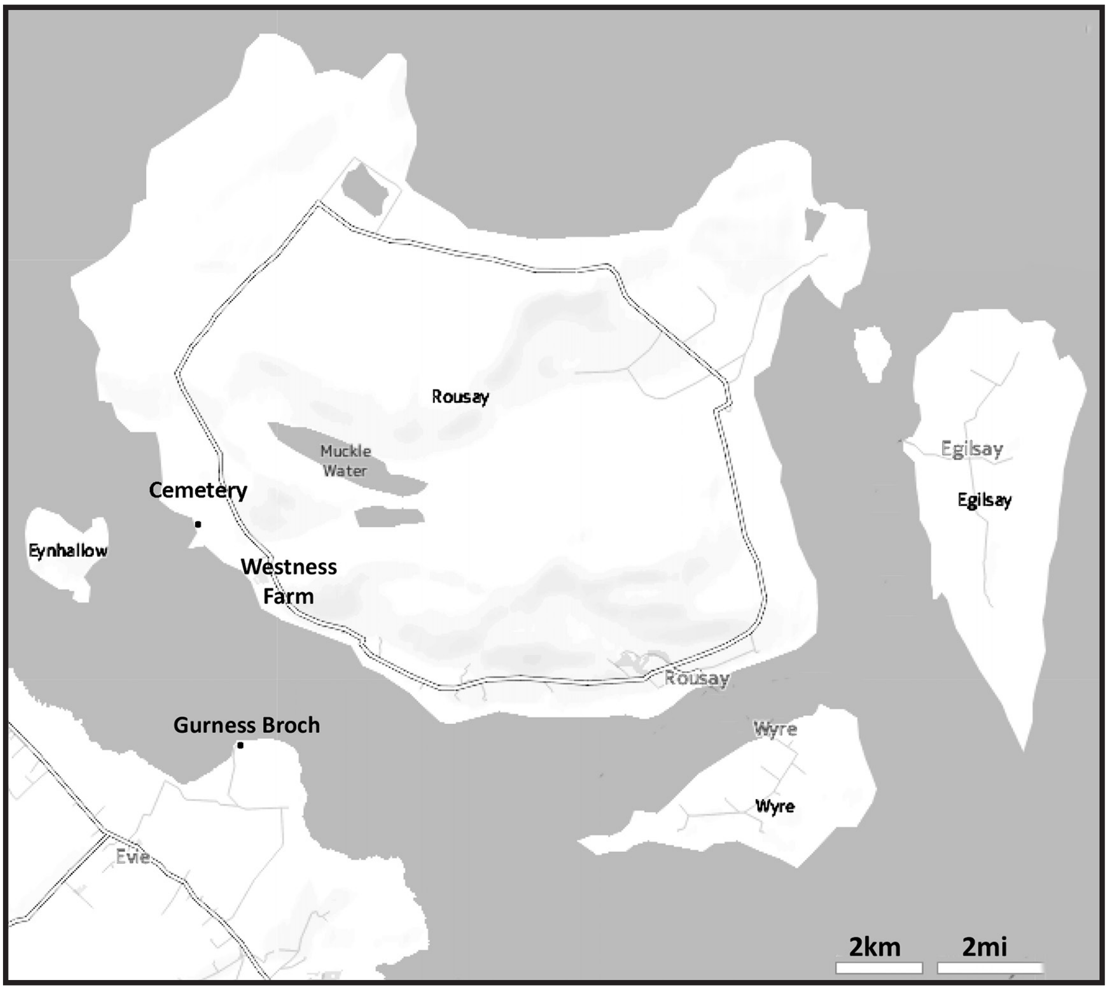

Figure 6.20, The Location of Westness on Rousay (Modified from Here 2015).

The Orkneyinga Saga mentions locations in Rousay several times; the most famous being the kidnap of Earl Paul Haakonsson during the battle for Orkney rule (Anderson *et al* 1873, Kaland 1993). The discovery of a grave furnished in a ‘Scandinavian’ style suggested that a Norse site may be in proximity. A preliminary survey and excavation to the north of the grave find revealed an 11-12th century farmstead (Wilson and Hurst 1964). Further excavations began in 1968 and continued intermittently until 1984 (Fg 6.21, Kaland 1993, RCAHMS 2016, Sellevold 1999).

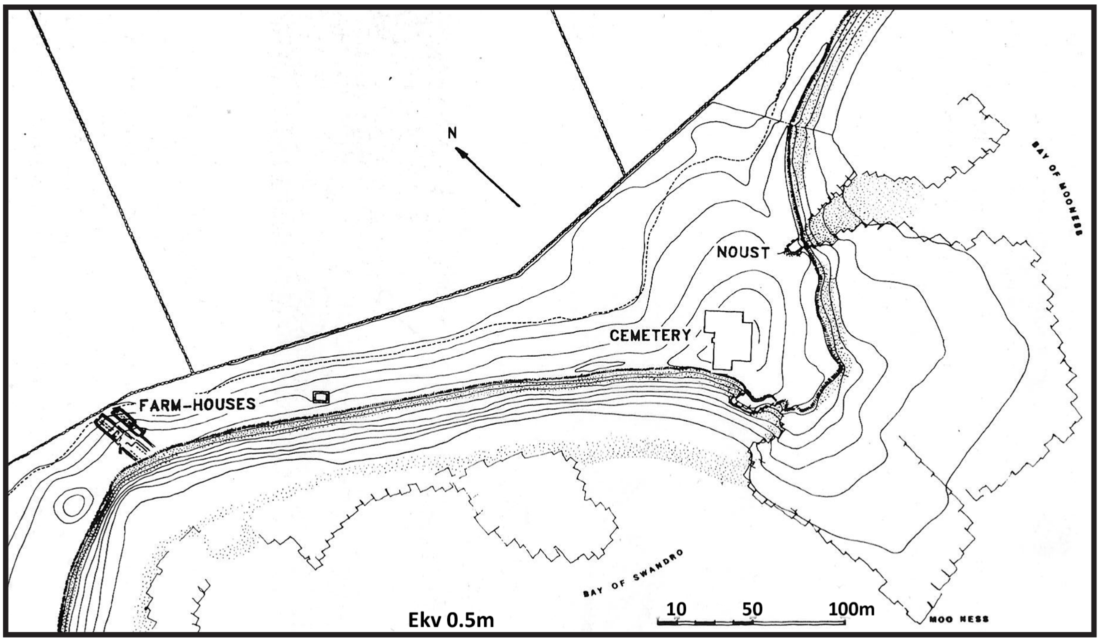

Figure 6.21, The Westness Excavation Site (Modified from Kalland 1993: 310).

Grave forms in the Westness cemetery were multi-form: oval dug graves with crouched inhumations, long-cists, two boat graves, and one boat shaped marked out with stones (Kaland 1993, Sellevold 1999). In general, the graves were placed without encroachment (but see Grave 2, Fg 6.22), implying that at some point there were surface markings (Sellevold 1999). Twenty-one of the graves were rectangular

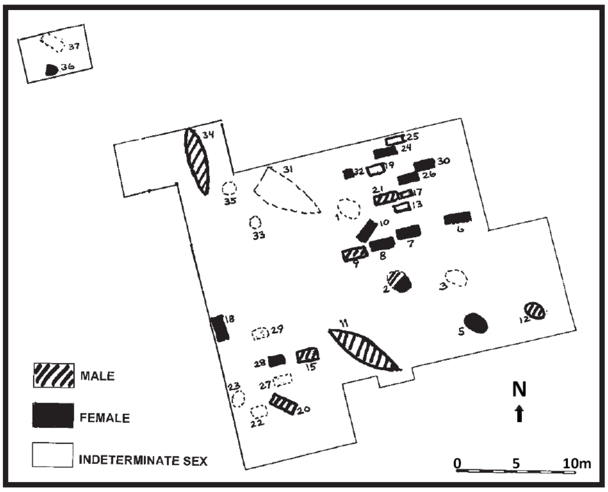

Figure 6.22, Plan of the Westness Cemetery (Modified from Sellevold 1999: 8).

in outline. All but four lay in a general east-west alignment. Five of the eight ovate graves and two of the three boat-shaped graves lay northwest-southeast. The remaining graves reported were aligned north-south.

Many of the graves were unaccompanied; however, several contained a range of grave goods; these include: swords, axes, spears and arrows, shield-bosses, jewellery, sickles, adzes and weaving implements (Kaland 1993, RCAHMS 2016). The site has not been fully reported; therefore, specific grave context for each individual was not possible.

Radiocarbon dating suggests primary usage of the cemetery during the 6-11th centuries (Table 6.5, Barrett and Richards 2004, Sellevold 1999). Several studies have been conducted on the Westness material, primarily to investigate migration and marine consumption (Barrett *et al* 2001, 2000, Barrett and Richards 2004). This additional information has altered the radiocarbon dates and these adjusted dates are also given in Table 6.5.

Recently, strontium and oxygen isotopes were analysed from six of the Westness individuals: 5, 11,12, 25, 28A, and 32 (Montgomery *et al* 2014). The first three individuals are generally considered viking/Norse based on both their radiocarbon dates and the grave environment (See Fg 6.22 and Table 6.5). The remaining three are generally considered Pictish for the same reasons. The Pictish individuals yielded strontium levels consistent with Orkney (Montgomery *et al* 2014). However, the two Norse males, 11 and 12, produced both strontium and oxygen isotope levels inconsistent with Orkney or even Scotland, but consistent with areas in Scandinavia. The mature adult female, 5, exhibited strontium and Oxygen levels suggesting she spent her childhood somewhere outside of Scotland but also *outside of Scandinavia* (Montgomery *et al* 2014).

Indiv	Lab No.	Cal AD, 1σ Radiocarbon	Cal AD, 1σ Marine Corr	Lab No.	Cal AD, 2σ Marine Corr	Artefact Dating	Lab No.	Cal AD, 2σ
5	T-6532	775-890	875–980	TO-7532	660–890	c.850–950		
6	T-6813	650–780	655–785					
7							TO-7196	423–620
9	T-7464	720–880	895–995					
10	T-6527	630–685	665–790		540–890			
11	T-6814	670–790	820–980		710–1140	c.850–950		
12	T-6815	680–880	880–1015		710–1160	c.850–950		
13	T-7465	600–650	670–770					
15							TO-7198	691-960
17	T-7467	800–950	965–1020					
18	T-6816	770–950	780–965					
19	T-7469	650–770	665–810					
20	T-6528	605–665	660–780		530–870			
21	T-7468	620–660	780–875		530–770			
24	T-7466	630–660	675–780		540–780			
25	T-6529	435–600	610–675		380–660			
26	T-6817	610–810	770–1020		400–1000			
28a	T-7471	550–620	650–685		430–670			
32	T-7470	600–660	635–685		430–780			
36	T-6530	1030–1170	1065–1230		1000–1270			
1963A							TO-7194	691–960
1963b				TO-7195	250–640			
Naust				AA-53127/ 50703	1670–1950			
	Sellevold 1999			Barrett and Richards 2004				Barrett *et al* 2000

Table 6.5, The Different Radiocarbon Dates from Westness.

6.3.5 Gurness

Site Number: HY32NE 5 — Age of Individual: Mature Adult

Number of Individuals: 1 — Sex of Individual: Female

Curating Institution: Orkney Museums

The Broch of Gurness lies at the northeastern point of the Orkney Mainland, off the Sands of Evie (Fg 6.20). It is across the Eynhallow Sound and visible from the site of Westness (6.3.4). The remains of both Iron and Viking Age structures are visible on the surface. The site was excavated in the 1930s, during which a viking style grave was discovered that had been inserted into the structure of the broch (Fg 6.23, Robertson 1969). A stone cist

Figure 6.23, Photograph of the Gurness Burial (Robertson 1969: Plate 33).

was created in which to place the inhumation. The grave was aligned east-west and covered with flagstones.

The individual had been dressed in a finely woven wool cloth, impressions of which had been left on the back of two oval brooches (Fg 6.24, RCAHMS 2016, Robertson 1969). Shell beads were found suggesting a 'necklet' suspended between the brooches. On the left was an iron sickle and on the right an iron knife. The grave goods date to the 10th century.

The site was placed under Guardianship in 2006; however, no further information pertinent to this research was available (RCAHMS 2016).

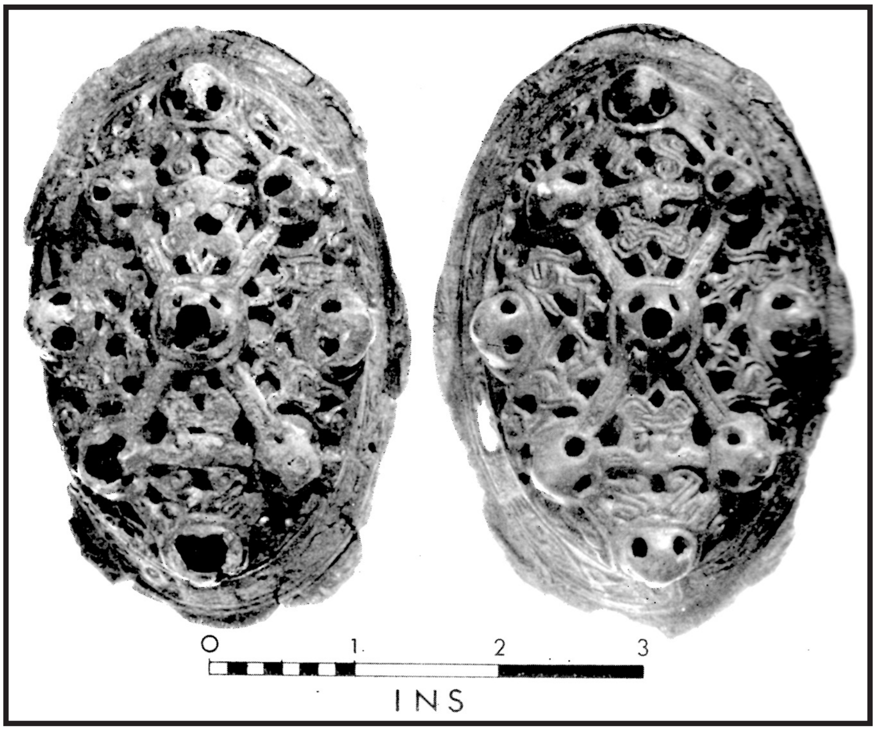

Figure 6.24, Photograph of the Gurness Brooches (Robertson 1969: Plate 34).

6.3.6 Birsay Bay

Site Number: HY22NW

Curating Institution: Orkney Museums

Number of Individuals: 10 Analysed, Total Unknown

Age and Sex of Individuals: See Table 6.6

Individual	Age	Sex
Brough Road 1	Middle Adult	Female
Brough Road 2	Young Child	Indeterminate
Brough Road 3	Infant	Indeterminate
Buckquoy 1	Mature Adult	Probable Male
Buckquoy 2 (Cist)	Middle Adult	Probable Male
Birsay Bay Area 1, SK1	Early Adult	Male
Birsay Bay Cutting 1, SK2	Mature Adult	Probable Male
Birsay Bay Area 1, SK3	Mature Adult	Male
Birsay Bay Area 2, SK1	Adult	Indeterminate
Birsay Bay Cist Grave 2	Mature Adult	Probable Female

Table 6.6, Individuals from Birsay Bay Available to this Research.
Age and Sex are Those Estimated by this Researcher.

Birsay Bay is located off the northwestern coast of the Orkney Mainland (Fg 6.25). As with many parts of Orkney, there is a long history of use along the shore. From 1976-1982 the Bay was subject to a major archaeological project to explore the exact nature of this usage (Morris 1989). During the project, 25 archaeological sites were identified along the 500-600 metres of investigated coastline. The most northwestern tip of land, the Brough, is separated from the mainland and only accessible by land bridge during low

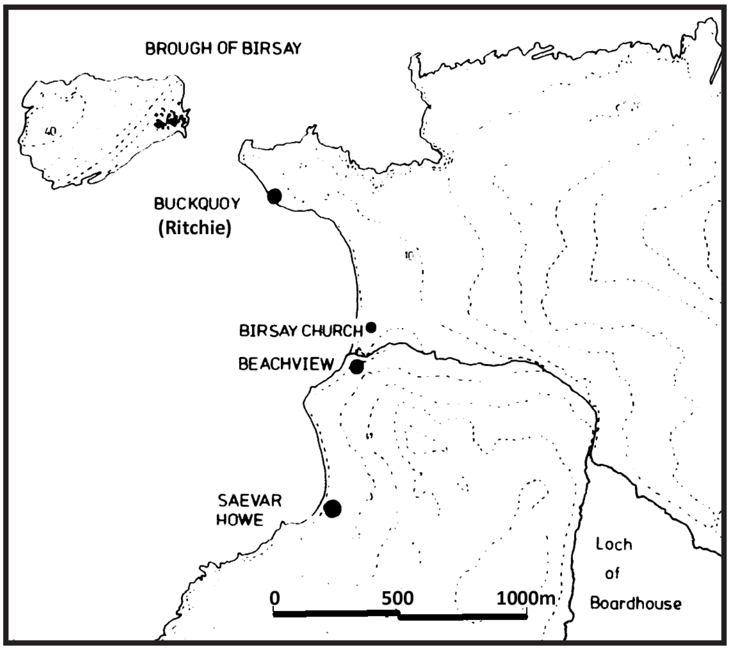

Figure 6.25, Location of Birsay Bay (Modified from Morris 1978: 4).

tide. On the Brough lie the remains of an early mediaeval monastery (circa 7th century), a ‘Viking’ settlement, and the original Bishop’s Palace, which has a presumed 12th century date (Morris 1989, RCAHMS 2016).

Over time, unfurnished long cists and human remains have eroded from the sand along the Birsay coastline (Morris 1989, RCAHMS 2016). Most of these were scheduled as separate records; however, the Birsay Bay Project conducted in the1980s revealed one relatively continuous site (Morris 1989).

A excavation by Ritchie in 1970-1 (HY22NW 14) revealed the foundations of both Pictish and Norse style housing (Fg 6.26, RCAHMS 2016, Ritchie 1976). The excavation also revealed three interments; however, it is unclear whether the association to the settlement is direct or tangential (Ritchie 1976).

The first burial was an unfurnished long cist with a clay floor (Fg 6.26, ‘grave’). The cist was located approximately two metres north of the latest house foundation: Phase V. Phase V was deemed late Norse by the excavators (Ritchie 1976). The term ‘late’ was not defined; however, usage of ‘late Norse’ tends to imply the 12-13th centuries (sometimes as late as the 14th). The adult remains from the cist lay supine in a southwest-northeast alignment; the head at the southwest. No grave goods were discovered and the remains were left undated. In the northeast corner of the Phase V house was a recumbent stone slab covering the remains of an infant (Ritchie 1976). No additional description of the infant burial is given (Fg 6.26, ‘burial’).

The third grave was a simple dug grave with one inhumation (Ritchie 1976). The body was crouched on the right side with the head detached and on top of the pelvis. The alignment was south-north with the head at the south (Fg 6.26, ‘burial—phase VI’). Included in the grave was a coin of Eadmund and a ring-headed pin, both of which date to the mid to late 10th century (RCAHMS 2016, Ritchie 1976). If this burial is stratigraphically linked to Phase VI, this would imply that Phase V was not late Norse, but 10th century

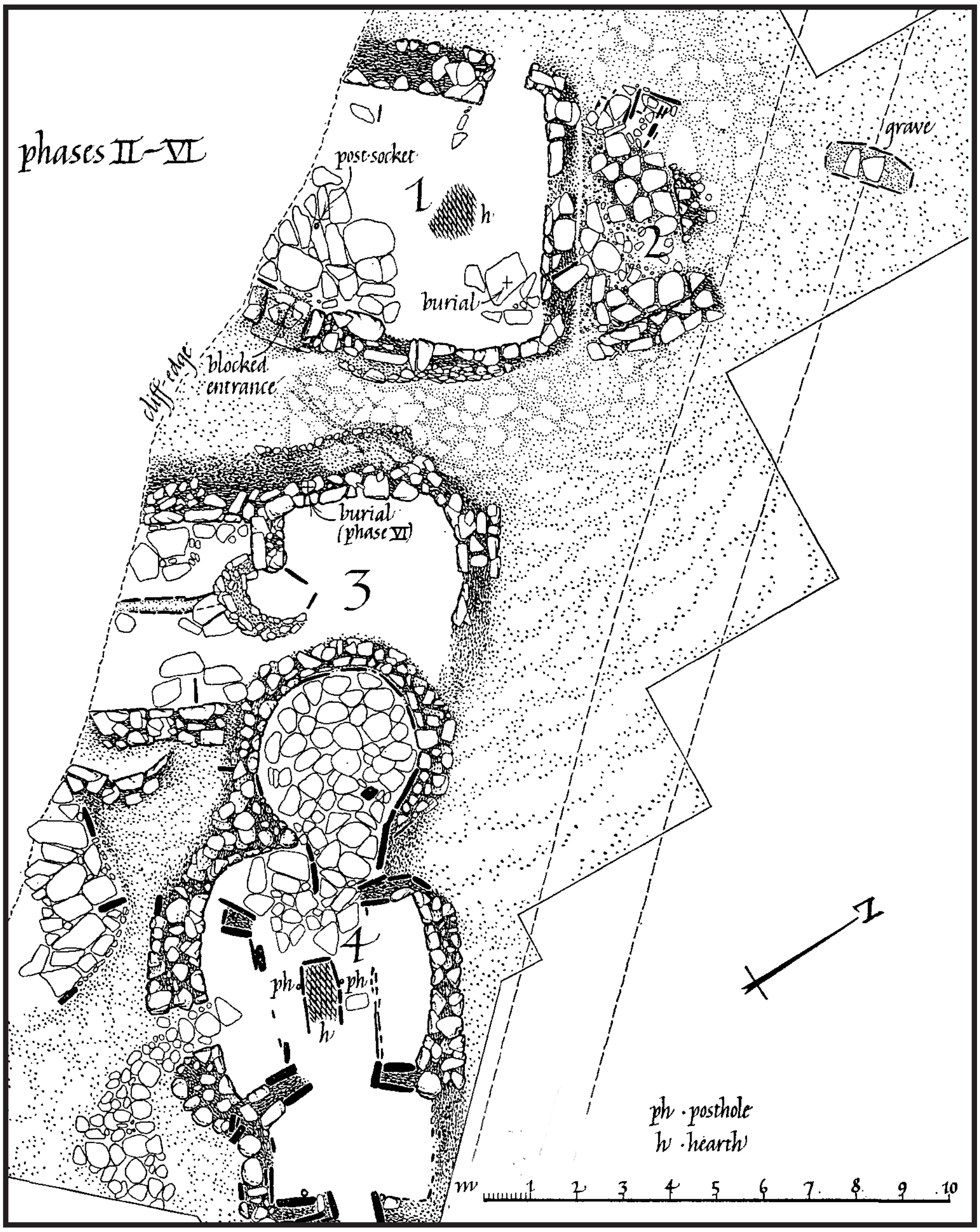

Figure 6.26, Burials in Relation to the Ritchie Excavation (After Ritchie 1976: 177).

or possibly Viking Age. The coin and pin found with the crouched burial *could* have been kept for centuries and deposited with the individual upon his death in the 12th century or later; although, this seems unlikely.

In 1976, coastal erosion exposed human bone in the cliff face south of the settlement excavation (HY22NW 61). Rescue efforts revealed an inhumation inserted above a cist. The earthen grave was positioned in a roughly east-west direction. Additional information on the grave context was not recorded

(Morris 1989, RCAHMS 2016). The individual in the cist lay north-south aligned. Flagstones separated the individual inside the cist and the individual interred below. Over the cist, and under the earthen grave, was a layer of pebbles. It is not clear whether these stones were spread as an even layer, or piled into a cairn. It is unclear which, if any, of the additional human remains used in the present research belonged to the 3rd individual.

The excavation of the above cist and earthen graves also revealed another, possible cist (Morris 1978, RCAHMS 2016). This site was returned to in 1978 and excavation confirmed a long cist, aligned east-west (HY22NW 62). This long cist had been inserted into a midden. A cairn was discovered under the midden, which covered a supine individual aligned northwest to southeast with the head at the southeastern side (Morris 1989, 1978, RCAHMS 2016). Within further midden material, stone slabs lay over an additional inhumation (HY22NW 16). The individual lay roughly east-west, head at the west. Erosion had taken most of the right side of the body. A knife was found by the left arm (Morris 1989, 1978, RCAHMS 2016).

Due to coastal erosion, the full cemetery extent is unknown. Ten individuals were available to this research; however, due to missing or potentially inaccurate documentation, it was not possible to match the grave to each individual. Table 6.7 lists the individuals with known radiocarbon dates.

Individual	Grave Type	Lab No.	Cal AD, 2σ	Source
BY 78 CU (Birsay Bay Area 1, SK1)	Earthen. Above BY 76 AS and AN	GU-1552 GU-1552	880–1160 889–1157	RCAHMS 2014 Barrett *et al* 2000
SK2, BY 76 AS (Birsay Bay Cutting 1, SK2)	Double cist.	GU-1551 TO-7047	260–620 424–644	RCAHMS 2014 Barrett *et al* 2000
SK1, BY 76 AN (Birsay Bay Area 1, SK3)	Earthen, Under BY 76 AS	GU-1550 GU-1550	240–570 242–597	RCAHMS 2014 Barrett *et al* 2000

Table 6.7, Individuals from Birsay with Known Radiocarbon Date plus Enclosure Type. The 1st date is the original assay (RCAHMS 2016). The 2nd has been modified based on estimated marine contribution to the individual's diet (Barrett *et al* 2000). Individuals for whom a match could be made to the records are listed in parentheses in the 'Individual' column.

Individual	Grave Type	Lab No.	Cal AD, 2σ	Source
SK3, BY 78 IO	Cairn.	GU-1554 TO-6696	130–540 543–665	RCAHMS 2014 Barrett *et al* 2000
SK2, BY 78 DT	Long cist.	GU-1553 TO-6691	650–980 782–1016	RCAHMS 2014 Barrett *et al* 2000
BY 78 BJ (Birsay Bay Cist Grave 2)	Earthen. Covered with stone slabs.	GU-1555 TO-7048	720–1020 642–780	RCAHMS 2014 Barrett *et al* 2000

Table 6.7, Individuals from Birsay with Known Radiocarbon Date plus Enclosure Type, cont. See Previous for Table Description.

6.3.7 Skaill House

Site Number: HY21NW 40 Curating Institution: Orkney Museums

Number of Individuals: 3 Age and Sex of Individuals: See Table 6.8

Individual	Age	Sex
1	Middle Adult	Probable Male
3	Adult	Indeterminate
Sand and Spoil	Young Middle Adult	Indeterminate

Table 6.8, Individuals from Skaill Available to this Research. Age and Sex are Those Estimated by this Researcher.

The Bay of Skaill sits on the west coast of Orkney Mainland (Fg 6.27).

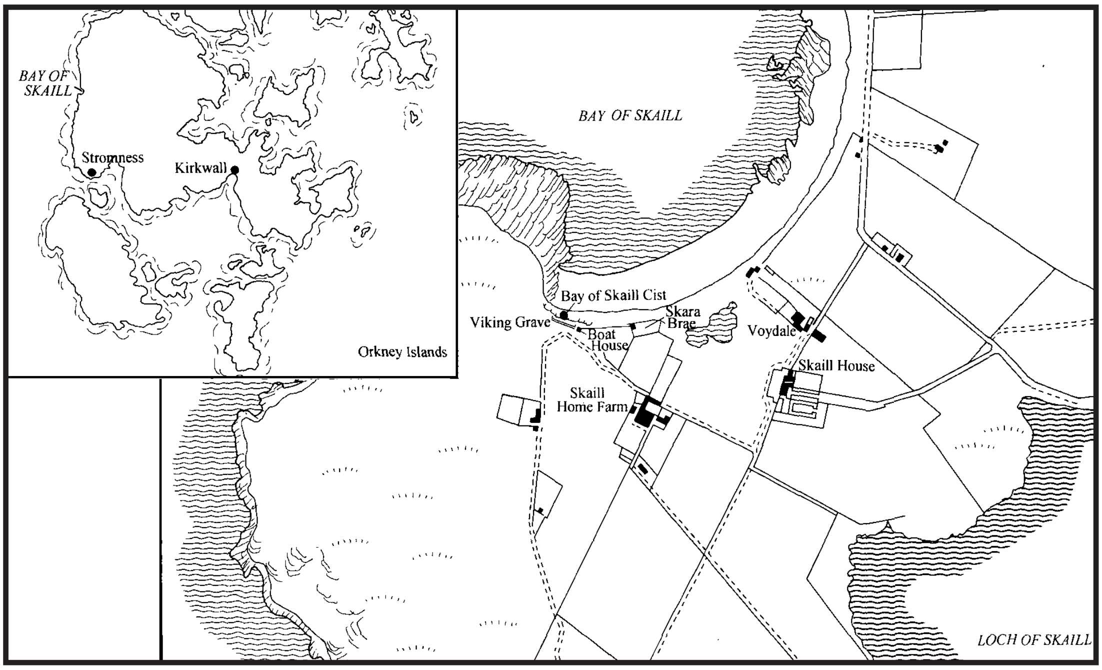

Figure 6.27, Location of Skaill House (Modified from James *et al* 1999: 754).

In 1996, digging a drainage ditch at the Skaill House Mansion revealed six skeletons in earthen graves. Ultimately, 12 adults and 15 juveniles were identified (James *et al* 1999, RCAHMS 2016). Samples taken from five individuals revealed an 11-14th century date for the cemetery (Fg 6.28).

Sample	Lab code	Years BP	δ13C%0	Calibrated dates 1 sigma	2 sigma
Skeleton 1	GU-7244	790 ± 70	−17.7	AD 1182–1275	AD 1043–1290
Skeleton 5	GU-7241	700 ± 70	−19.7	AD 1267–1290	AD 1242–1389
Skeleton 7	GU-7242	820 ± 60	−20.1	AD 1166–1265	AD 1040–1280
Skeleton 8	GU-7240	750 ± 70	−23.8	AD 1225–1283	AD 1160–1384
Skeleton 10	GU-7243	710 ± 60	−19.5	AD 1262–1290	AD 1220–1392

Figure 6.28, Radiocarbon Dates from Skaill House (James *et al* 1999: 761).

The exploratory excavation revealed twelve upright stone grave markers and several graves overlain with flat slabs. Figure 6.29 illustrates the basic site plan. One 'head-box' and one cist were also identified. The graves

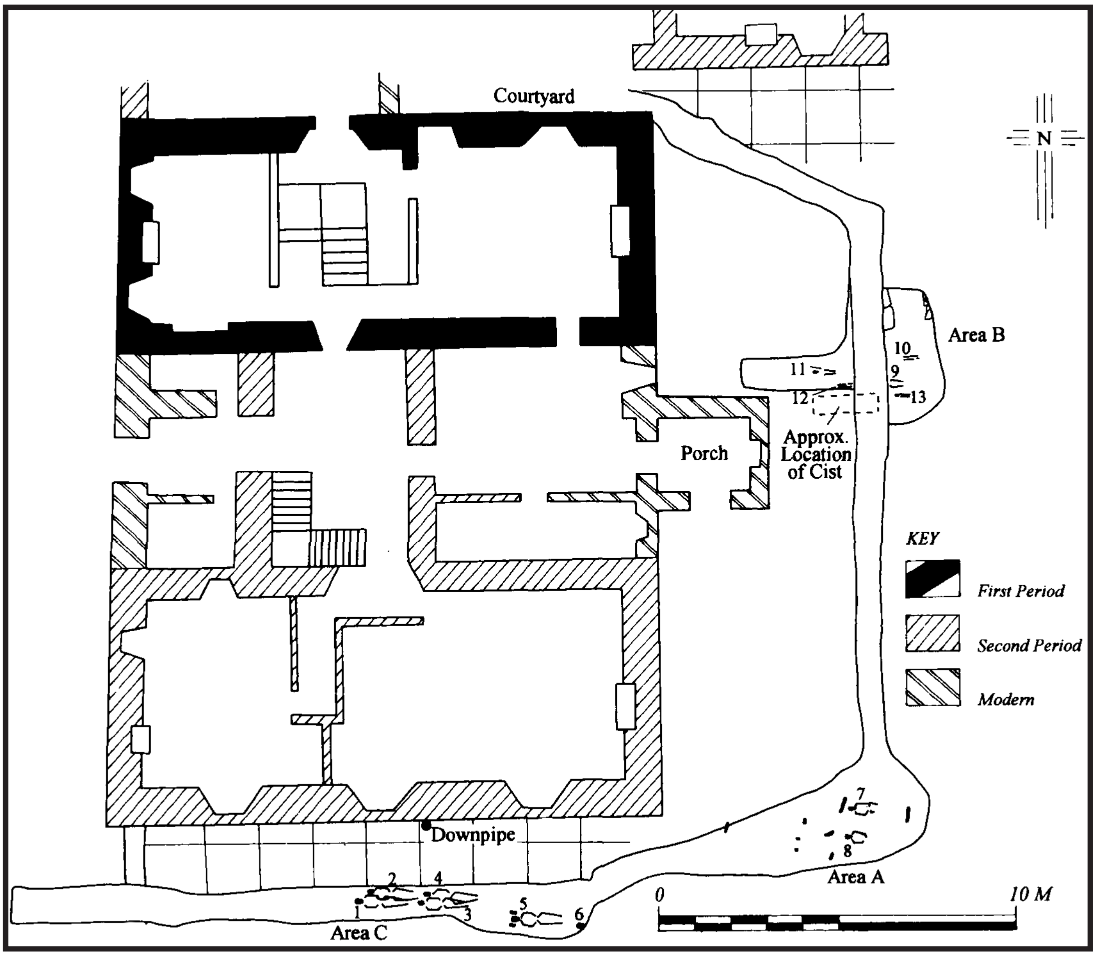

Figure 6.29, Plan of 17th Century Skaill House with Grave Finds (James *et al* 1999: 757).

were aligned generally east-west with heads at the west (James *et al* 1999, RCAHMS 2016). No grave goods were uncovered. Most of the individuals were left in situ.

6.3.8 Breckness

Site Number: HY20NW 6

Curating Institution: Orkney Museums

Number of Individuals: 13 Analysed, Total Unknown

Age and Sex of Individuals: See Table 6.9

Individual	Age	Sex
1	Adult	Male
2	Early Adult	Probable Male
3	Middle Adult	Male
4	Adult	Indeterminate
5	3	Indeterminate
6	Adult	Indeterminate
7	Adult	Indeterminate
8	Young Middle Adult	Indeterminate
Broch 1970	Young Middle Adult	Probable Female
Balin-Smith 1	Adolescent	Indeterminate
Balin-Smith 2	Early Adult	Indeterminate
EN405	Mature Adult	Probable Male
EN405.2	Adult	Indeterminate

Table 6.9, Individuals from Breckness Available to this Research.
Age and Sex are Those Estimated by this Researcher.

Currently, Breckness is a small farmstead on the southwest coast of the Orkney mainland, just west of Stromness (Fg 6.30, RCAHMS 2016). The former chapel was removed in 1929 so the area could undergo cultivation (Ballin Smith *et al* 2004, RCAHMS 2016). This cultivation revealed human remains under the soil. Still visible on the surface of the landscape are the remains of a possible early mediaeval chapel and 16-17th century bishop's house (Ballin Smith 2002, RCAHMS 2016). Coastal erosion in the 1980s revealed an Iron Age round house and a broch underneath the chapel and Bishop's house.

More severe erosion in 1987 revealed inhumations in a generally east-west alignment lying atop the round house (Ballin Smith 2002, Lorimer nd). More severe erosion in 1987 revealed inhumations in a generally east-west alignment lying atop the round house (Ballin Smith 2002, Lorimer nd, RCAHMS 2016). The burials lay close together, some on top of other graves with their heads facing west. The graves had been dug into the masonry and intra-mural passage of broch. In 1992-3, further erosion revealed more of the broch along with further bone fragments inserted into the broch fill (Ballin Smith *et al* 2004, RCAHMS 2016).

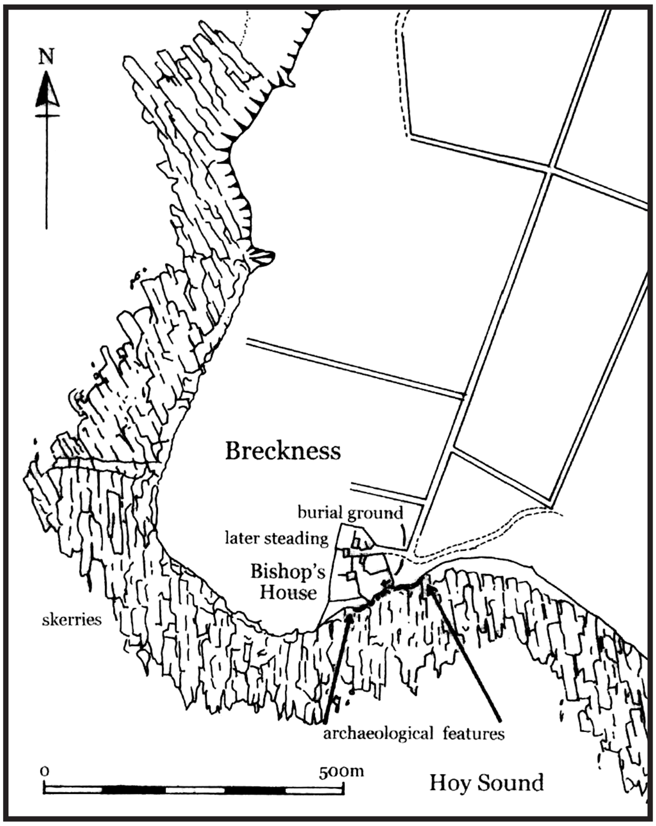

Figure 6.30, The Site of Breckness (Modified from Balin Smith 2002:174).

Thirteen individuals were analysed for this research. No further information was available regarding the burial context or the history of the site.

6.3.9 Bu of Cairston

<u>Site Number</u>: HY20NE 16

<u>Curating Institution</u>: Orkney Museums

<u>Number of Individuals</u>: 3 Analysed, 109 Reported

<u>Age and Sex of Individuals</u>: See Table 6.10

Individual	Age	Sex
009	Young Middle Adult	Indeterminate
107	Adult	Indeterminate
012	Adult	Indeterminate

Table 6.10, Individuals from the Bu of Cairston Analysed for this Research. Age and Sex are Those Estimated by this Researcher.

The Bu of Cairston is located on the south side of the Orkney Mainland, on the western shore of the Bay of Ireland, just east of Stromness (Fg 6.31). There is a small farmstead currently on the site. However, as the 'bu' eponym suggests, the site was historically an Earldom estate and tradition holds that a church and burial ground were once on the property (RCAHMS 2016, Stevens *et al* 2005). The Bu is also mentioned in the Orkneyinga Saga as having a castle (Anderson *et al* 1873); although, the specifics of this particular claim has come into doubt (Stevens *et al* 2005). The foundations of a 16-17th century building are visible on the surface, and until recently, this was the only archaeological indication of pre-modern use of the site (RCAHMS 2016).

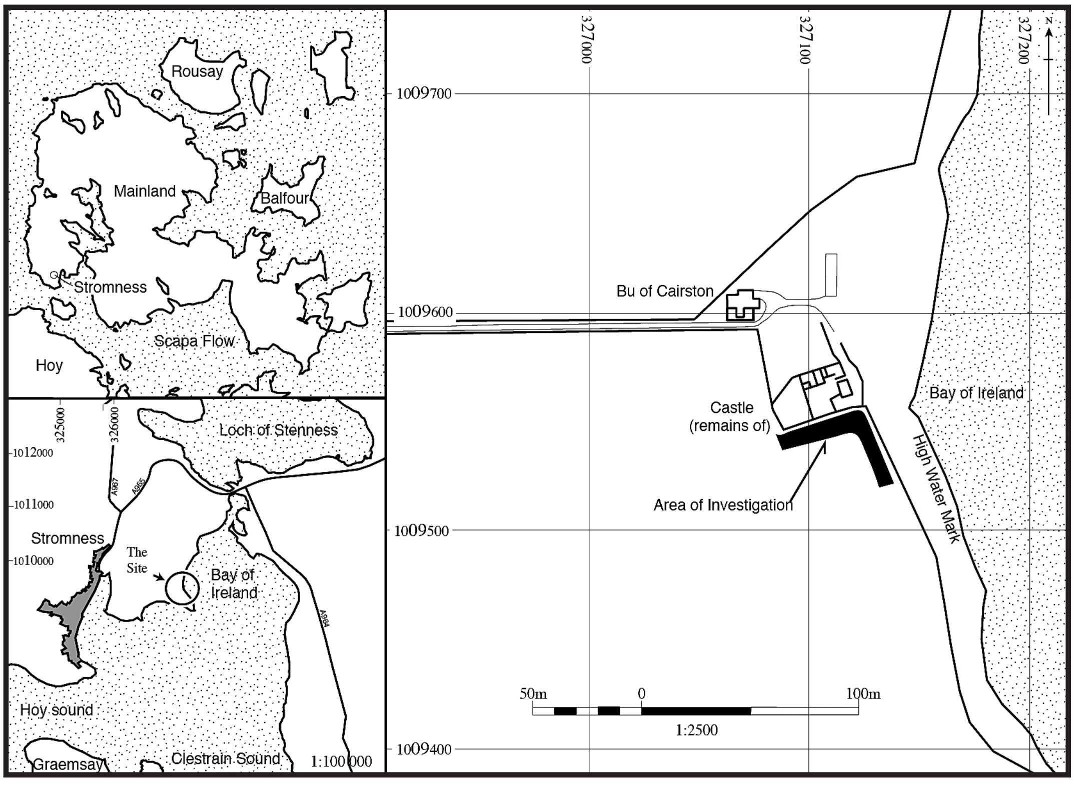

Figure 6.31, The Bu of Cairston Excavation Site (Stevens *et al* 2005: 372).

In 1985, the cutting of a drainage ditch revealed a broch underlying the modern barn (RCAHMS 2016, Stevens *et al* 2005). In 2002, an excavation was undertaken in advance of construction of new sewage works, just south of the farm. One-hundred twenty-five grave cuts were discovered during the excavation, with a total of 109 individuals (Stevens *et al* 2005). Radiocarbon dating of two of these individuals provided an original date of 1040-1220 Cal AD, 2σ (Fg 6.32). Further analysis by Barrett and Richards (2004) to determine marine consumption alter the radiocarbon date to 1180-1400 Cal AD, 2σ (SUERC-1201).

Lab code	*Sample material*	*Context number*	*$\delta^{13}C$ (%)*	*Years BP*	*1σ calibrated range*	*2σ calibrated range*
SUERC-1201 (GU-11500)	Human bone	009	–18.0	895 ± 35	AD 1040–1090 (29.4%) AD 1120–1140 (12.4%) AD 1150–1210 (26.5%)	AD 1030–1220 (95.4%)
SUERC-1202 (GU-11501)	Human bone	107	–19.0	900 ± 35	AD 1040–1100 (33.1%) AD 1110–1190 (35.1%)	AD 1030–1220 (95.4%)
SUERC-1407 (GU-11499)	Charcoal: birch	335	–25.4	4700 ± 40	3630–3600 BC (7.8%) 3530–3490 BC (13.5%) 3460–3370 BC (46.9%)	3640–3550 BC (21.1%) 3540–3360 BC (74.3%)

Figure 6.32, Radiocarbon Dates from the Bu of Cairston (Stevens *et al* 2005: 376).

The individuals were deposited supine in a general east-west alignment with their heads at the west (Fg 6.33, RCAHMS 2016, Stevens *et al* 2005). Only three individuals were placed with their legs flexed. Three additional individuals lay with one leg flexed and one extended. The remainder lay with legs extended. All but two graves were of single individuals. Burial 017 contained one old adult and an additional, but unexcavated, adult. Burial 089 contained one adult and two neonates. Cists, full or partial, were evident in only six graves. Head boxes were used on ten graves, with a further three possible (graves disturbed). Single stones placed above the head or chest were used in seven of the graves, and five contained evidence of coffin usage

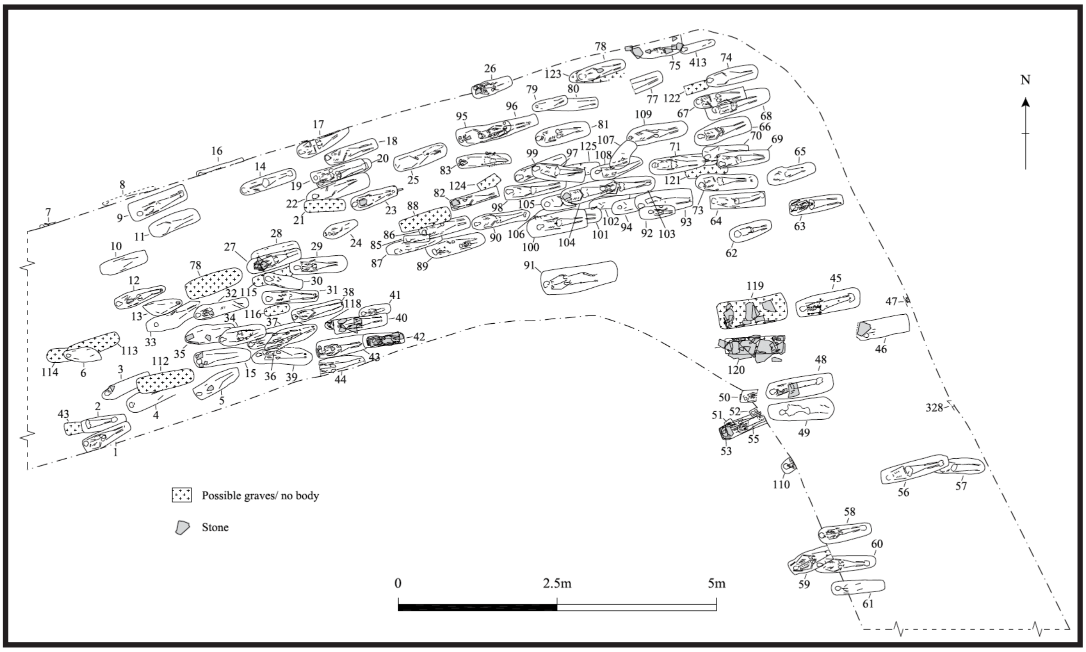

Figure 6.33, Illustration of the Graves at the Bu of Cairston (Stevens *et al* 2005: 379).

(Stevens *et al* 2005).

Unfortunately, the skeletons were highly fragmented and cortical preservation was very poor. Skeletal analysis for the present research began with the two individuals for which radiocarbon dates had been determined. Upon the completion of one further individual, the benefit of careful re-analysis of the entire assemblage was deemed an unproductive use of time.

6.3.10 Newark Bay

<u>Site Number</u>: HY50SE 3

<u>Curating Institution</u>: Orkney Museums

<u>Number of Individuals</u>: 72 Analysed,

Total Population Undetermined

<u>Age and Sex of Individuals</u>: See Table 6.11

Indiv	Age	Sex
1	Young Mid Adult	Prob Female
2	Young Mid Adult	Prob Male
3	Adult	Indeterminate
4	Middle Child	Indeterminate
5a	Adolescent	Indeterminate
5b	Adult	Indeterminate
5c	Adult	Indeterminate
6	Adult	Indeterminate
7	Young Mid Adult	Prob Male
9	Adult	Indeterminate
10	Early Adult	Prob Female
11	Early Adult	Prob Male
31b	Adult	Indeterminate
31c	Adult	Indeterminate
2012	Middle Child	Indeterminate
68/6	Adult	Indeterminate
68/8	Mature Adult	Prob Female
68/9	Old Child	Prob Female
68/9b	Infant	Indeterminate
68/12	Young Mid Adult	Male
68/13	Adolescent	Indeterminate
68/17	Adult	Indeterminate
68/24b	Adult	Indeterminate
68/26	Adult	Indeterminate
68/28	Early Adult	Male
68/31	Mature Adult	Prob Female
68/32	Adult	Indeterminate
68/33	Adolescent	Indeterminate
69/1-2	Adult	Indeterminate
69/7	Mature Adult	Prob Male
69/8	Adult	Prob Female
69/26	Young Mid Adult	Male
69/28	Young Mid Adult	Prob Male
69/29	Old Child	Indeterminate
69/32	Young Mid Adult	Prob Female
69/87	Middle Adult	Male
69/98	Middle Adult	Prob Female
70/6	Adult	Indeterminate
70/7	Young Mid Adult	Prob Male
70/29	Middle Adult	Prob Female
70/37	Adolescent	Female
70/d2	Adult	Indeterminate
70ab	Adult	Male
71/11	Middle Adult	Prob Male
71/12	Middle Adult	Prob Female
71/12a	Adult	Prob Female
71/13b	Young Mid Adult	Female
71/14	Adolescent	Indeterminate
Arion	Middle Adult	Male
CC3A	Young Mid Adult	Prob Female
D5/D6	Adult	Indeterminate
D1	Adolescent	Male
D2	Old Child	Indeterminate
D3	Early Adult	Male
D4	Early Adult	Prob Female
D5	Middle Adult	Male
D6	Middle Adult	Female
D7	Adult	Indeterminate
D8	Adult	Indeterminate
D9	Middle Adult	Prob Male
Lndn	Adult	Indeterminate
MY	Early Adult	Prob Female
NB1	Middle Adult	Male
NB2	Young Child	Indeterminate
NB3	Young Child	Indeterminate
NB4	Young Child	Indeterminate
RA1	Old Child	Indeterminate
RA2	Adult	Indeterminate
TM7	Mature Adult	Prob Female
UNK1	Middle Adult	Male
UNK2	Middle Child	Indeterminate
UNK3	Young Child	Indeterminate

Table 6.11, Individuals from Newark Bay Available to this Research.
Age and Sex are Those Estimated by this Researcher.

Newark is located on the southern edge of the Deerness peninsula, on the western side of the Orkney mainland (Fg 6.34). A personal visit to the

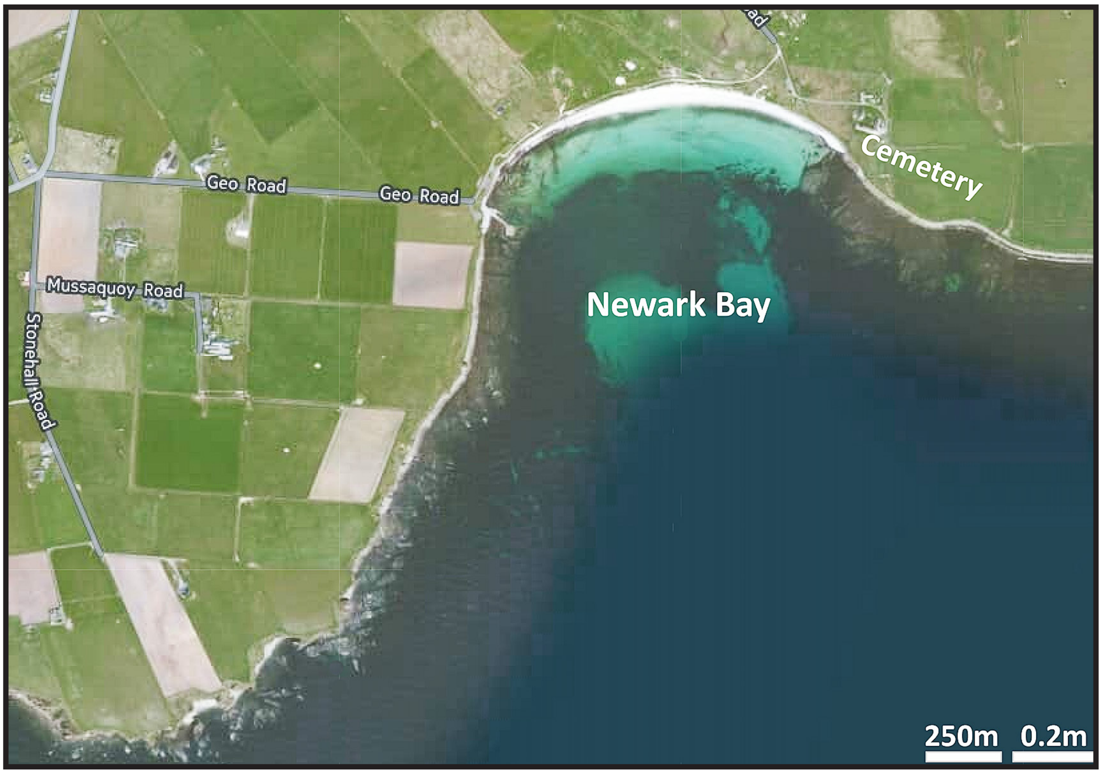

Figure 6.34, Newark Bay on the Southern Shore of the Deerness Peninsula, Orkney Mainland (Modified from Here 2015).

site in 2012 revealed that the land surface lies approximately two metres above the shoreline, on top of which there sits a farmstead. Ongoing coastal erosion has created a cliff face on which human remains are visible, continue to emerge, and are commonly lost to the sea (RCAHMS 2016, Orkney Museums, Pers Comm).

A 17th century map shows a chapel at this location (Blaeu and J Blaeu 1654), although no surface trace remained by the 1930s (RCAHMS 2016). Never published, the area was excavated between 1969 and 1972 (see Brothwell 1977). Remains of the chapel were reported, with coin evidence, with a 10th century date (RCAHMS 2016). An early modern 'lairds house' was also reportedly discovered. Two-hundred burials were reportedly excavated and lifted (Richards *et al* 2006).

Two further east-west aligned burials were exposed in 1985 by coastal erosion (RCAHMS 2016). A visit to the site in 2000 records eight burials visible in the cliff face and a further three discovered while excavating those eight (Lowe 2000, RCAHMS 2016). These graves were aligned generally northwest-southeast with no grave goods or coffin fittings. One individual may have been in a cist; however, (s)he was not fully excavated and, therefore, the possibility of a head-box exists. One individual lay prone; the rest supine.

A visit by this researcher in 2012 found at least five individuals visible in the cliff face (Fg 6.35); one of whom was an infant (or neonate). Only part of each skeleton was visible; though all were aligned roughly east-west with heads at the east. Two individuals were positioned on their left sides facing north in a flexed or crouched position. A carved bone pin was discovered loose on the rocks below the cliff face (Fg 6.36)[3]. Also scattered on the rocks all the way to the shore were various human bones of both juvenile and adult age.

Figure 6.35, Spinal Column Visible in the Newark Cliff Face (Author's Image 2012).

Figure 6.36, Pin Found by Author at Newark Bay (Author's Image 2012).

Radiocarbon dating from the 1969-72 assemblage places the majority of the burials in the 8–13th centuries; however, the site may to have still been in use as late as the 17th century. Figure 6.37 gives several of the dates. (For a more complete list, see Barrett *et al* 2000, Barrett and Richards 2004, and Richards

3 The pin was accessioned into Orkney Museums.

Skeleton	Lab no	$\delta^{13}C$	$\delta^{15}N$	AMS date
NB 68/2	TO-6940	−18.4	13.0	550 ± 40
NB 68/12	TO-7173	−16.9	14.4	930 ± 40
NB 68/14	GU-10955	−18.0	13.4	630 ± 50
NB 68/16A	TO-7174	−20.0	10.9	1190 ± 40
NB 68/20	AA-54931	−19.6	10.4	1055 ± 40
NB 68/5	AA-54930	−17.8	13.4	590 ± 40
NB 69/104A	TO-7188	−16.3	15.6	1030 ± 40
NB 69/104B	TO-7189	−19.4	11.0	1130 ± 50
NB 69/105	TO-7190	−18.7	11.6	990 ± 50
NB 69/107	TO-7191	−17.9	12.1	1340 ± 60
NB 69/11	TO-7180	−19.6	9.8	1380 ± 30
NB 69/34	TO-7181	−19.8	10.9	930 ± 40
NB 69/36	TO-7182	−20.3	8.6	1090 ± 40
NB 69/67a	TO-7183	−17.7	13.7	990 ± 40
NB 69/69	TO-7184	−17.5	14.4	910 ± 40
NB 69/8	TO-7178	−17.8	13.7	830 ± 30
NB 69/83	TO-7185	−17.5	13.8	1060 ± 40
NB 69/83	AA-54932	−17.5	13.8	1070 ± 45
NB 69/85	TO-7186	−19.6	10.8	1000 ± 40
NB 69/99	TO-7187	−18.5	12.0	1060 ± 40
NB 70/1	TO-7192	−19.2	12.0	1010 ± 60
NB 70/15	AA-54933	−16.9	13.5	1060 ± 35
NB 70/37	AA-54934	−17.5	13.7	1130 ± 40
NB 70/39	AA-54935	−17.3	14.4	965 ± 40
NB 70/6	TO-6937	−18.4	14.4	700 ± 40
NB 71/1	AA-54936	−15.4	15.6	1075 ± 35
NB 71/2	AA-54937	−17.1	14.6	1075 ± 35
NB 71/3	TO-7193	−19.1	10.4	1200 ± 40
NB 71/8	TO-6934	−17.7	13.8	1160 ± 60
NB 71/8	AA-54938	−17.7	13.8	1020 ± 45

Figure 6.37, Radiocarbon Dates from Newark Bay (Richards *et al* 2006: 129).

et al 2006).

In addition, Richards *et al* (2006) performed an analysis of the carbon and nitrogen isotopes from the Newark cemetery. In general, the population consumed a diet high in marine content compared to other mediaeval populations in the UK. Females seemed to have a more varied diet than males; and, there was a statistically significant difference in both the $\delta^{13}C$ and $\delta^{15}N$ values between males and females suggesting that males consistently consumed a higher level of marine based foods than females.

6.4 Caithness and Sutherland

Caithness is the most northeastern area of Mainland Scotland (Fg 6.38). It is mostly rolling farmland, moorland, and blanket bog (Lindsay *et al* 1988). Sutherland is the north and northwestern most part of the Mainland. The

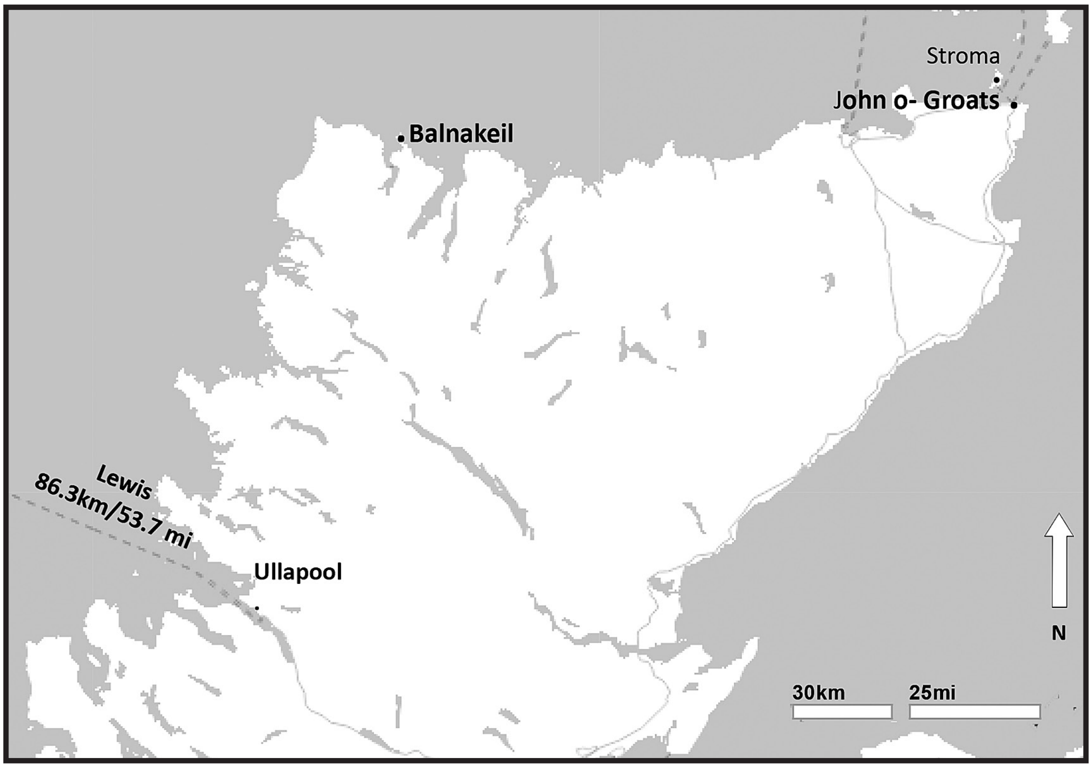

Figure 6.38, Caithness and Sutherland (Modified from Here 2015).

landscape is rugged and mountainous (Cadell 1896, Lindsay *et al* 1988). There is ongoing debate as to the nature of political control in the early mediaeval period (Crawford 2013, Williams 2007, 2001). There is limited documentary information; however, evidence may suggest that Caithness and Sutherland began as one territory and it was divided during Norse control (Crawford 2013, Gray 1922). Much of the archaeological work has focused on the Iron Age and much of that done prior to 1950 (Tucker 2010).

By the 10th century, Caithness was a considered a part of the Orkney Earldom (Crawford 2013). During a time when waterways were as well travelled as land—if not more so—the Pentland Firth was a major route which linked the lands of the North. The political status of Sutherland is unclear at this time; however, it does appear that the territory was separated from Caithness somewhere between the 10th and 13th centuries. In 1266, the Treaty of Perth ceded Caithness, Sutherland, and the Western Isles to the Scottish Crown (Stringer 2005).

6.4.1 John o' Groats

Site Number: ND37SE 37

Curating Institution: National Museums Scotland

Number of Individuals: 59 Analysed, Total Population Undetermined

Age and Sex of Individuals: See Table 6.12

Indiv	Age	Sex
7a	Neonate	Indeterminate
7b	Neonate	Indeterminate
12	Infant	Indeterminate
15	Adult	Female
17	Middle Adult	Indeterminate
19	Middle Adult	Male
19a	Early Adult	Female
19b	Neonate	Indeterminate
21	Young Mid Adult	Male
21b	Neonate	Indeterminate
21c	Young Child	Indeterminate
21d	Infant	Indeterminate
21e	Middle Child	Indeterminate
21f	Adult	Female
21g	Early Adult	Prob Female
23	Adult	Male
23b	Adult	Indeterminate
26b	Adult	Indeterminate
29	Adolescent	Prob Male
30	Adult	Indeterminate
30b	Neonate	Indeterminate
D1	Middle Adult	Male
D2	Adult	Indeterminate
D3	Young Mid Adult	Prob Male
D4	Adult	Male
D5	Adult	Female
D6	Adult	Prob Male
D7	Middle Adult	Male
D8	Mature Adult	Male

Indiv	Age	Sex
D9	Young Mid Adult	Prob Female
D10	Adult	Prob Female
D11	Adult	Male
D12	Adult	Female
D13	Mature Adult	Male
D14	Adult	Male
D19	Adult	Male
D15	Adult	Male
D16	Young Mid Adult	Prob Female
D17	Adult	Prob Male
D18	Adult	Male
D20	Middle Adult	Prob Female
D21	Adult	Indeterminate
D22	Adult	Indeterminate
D23	Adult	Indeterminate
D24	Adult	Indeterminate
D25	Adult	Indeterminate
D26	Adult	Indeterminate
D27	Adult	Indeterminate
D28	Adult	Indeterminate
D29	Adult	Indeterminate
D30	Adult	Indeterminate
D31	Young Child	Indeterminate
D32	Infant	Indeterminate
D33	Middle Child	Indeterminate
D34	Young Child	Indeterminate
D35	Middle Child	Indeterminate
D36	Adolescent	Indeterminate
D37	Old Child	Indeterminate
D38	Early Adult	Male

Table 6.12, Age and Sex of the Individuals Examined from John o' Groats.
Estimates are Those of This Researcher.

In 1989, work began on the surrounding land at the John o' Groats Hotel, just across from the ferry terminal (Driscoll 1989, RCAHMS 2016). In May, a rescue excavation was undertaken to recover the human remains disturbed by the work (Fg 6.39).

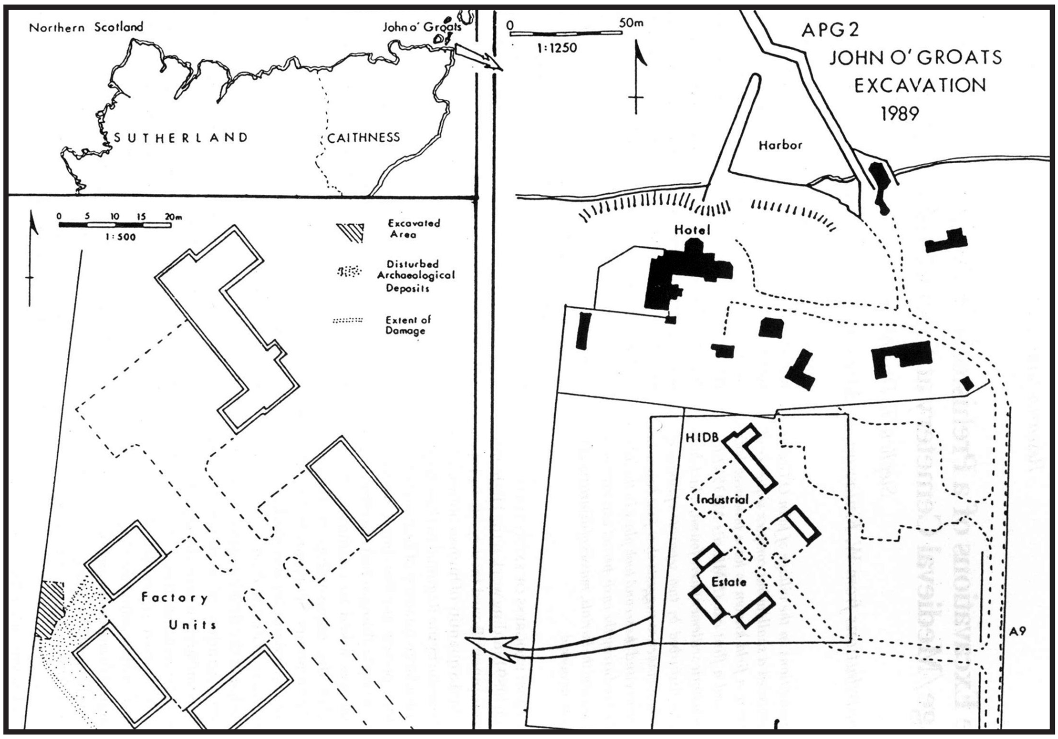

Figure 6.39, John o' Groats and the Excavation Area (Driscoll 1989: 30).

The discernible grave cuts were generally east-west aligned and no grave furnishings were discovered. It was evident that a good portion of the graves had been disturbed (Driscoll 1989). A portion had been displaced for the insertion of burials 29 and 30 (Fg 6.40). Many of the recovered bones were disarticulated and had possibly been reburied (2242 bone fragments were uncovered). The two 'inserted' burials (29 and 30) were placed roughly northwest-southeast with their heads at the north. Radiocarbon dates suggest that these individuals are also the latest burials (Fg 6.41). Driscoll (1989) estimated 71 adults and 13 juveniles in the assemblage. Eighteen juveniles and 41 adults were counted from the portion available to this thesis.

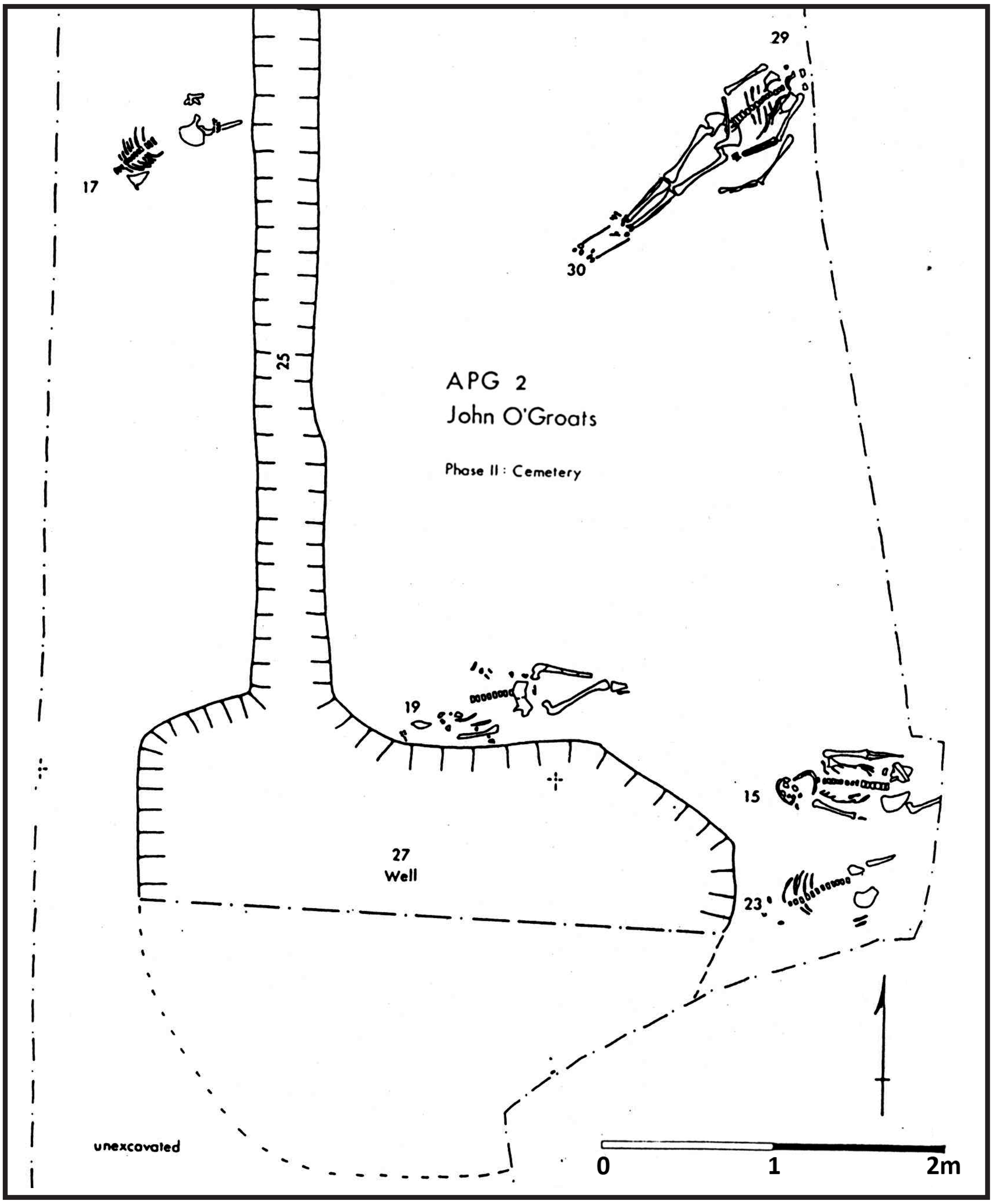

Figure 6.40, Sketch of the Burials at John o' Groats (Modified from Driscoll 1989: 34).

Context	*Lab Ref*	*Est. Age*	*Calibrated Age Range (1 sigma) (cal age) AD*
Mass of Bone 16	GU-2652	1220±50 ad	1258 (1278) 1283
Burial 17	GU-2655	1020±90 ad	999 (1040,1095,1191, 1140, 1151) 1212
Burial 19	GU-2654	930±60 ad	980 (999) 1146
Burial 29	GU-2653	1670±5O ad	1520 (1642) 1656

Figure 6.41, Radiocarbon Dates from John o' Groats (Driscoll 1989: 35).

6.4.2 Balnakeil

Site Number: NC37SE 3

Curating Institution: National Museums Scotland

Number of Individuals: 1

Age of Individual: Old Child

Sex of Individual: Indeterminate.

In May of 1991, storms washed out the shoreline at Balnakeil Bay (Fg 6.42) on the south side of Sutherland's Faraid Head (Batey and Paterson 2012, Low *et al* 2000).

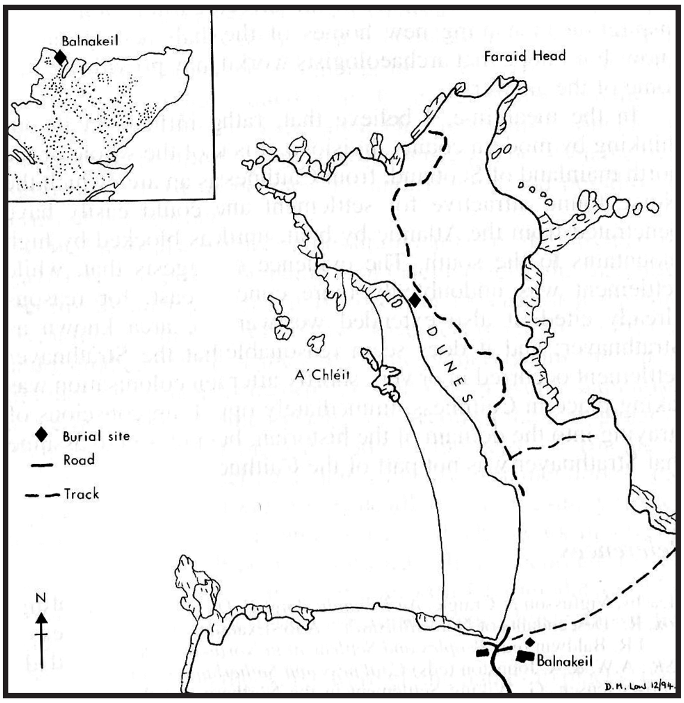

Figure 6.42, Location of Balnakeil and the Burial Site (Modified from Low *et al* 2000:24).

Human bone was discovered protruding from the sand by a couple on holiday who informed the constabulary (Batey and Paterson 2012, Low *et al* 2000). Preliminary investigation revealed 'Viking' style artefacts. Excavation uncovered a juvenile who had been placed in a dug grave, on the right side with legs flexed (Fg 6.43 and 6.44). Included with the grave was a sword with

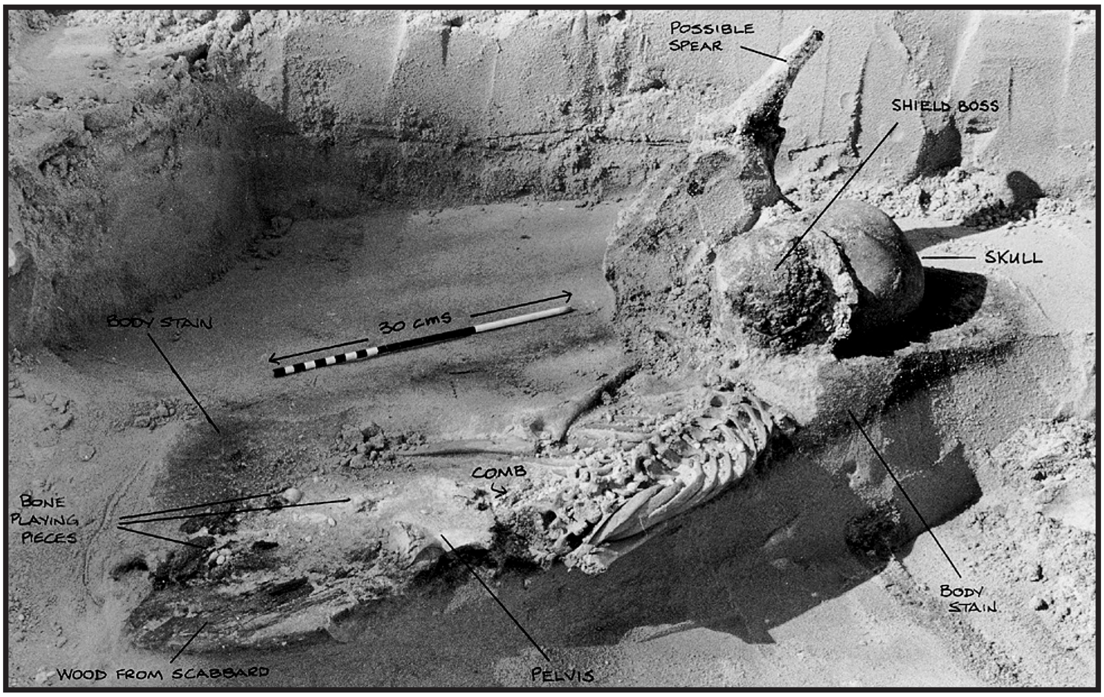

Figure 6.43, Photo of Balnakeil in situ (Batey and Paterson 2012: 635).

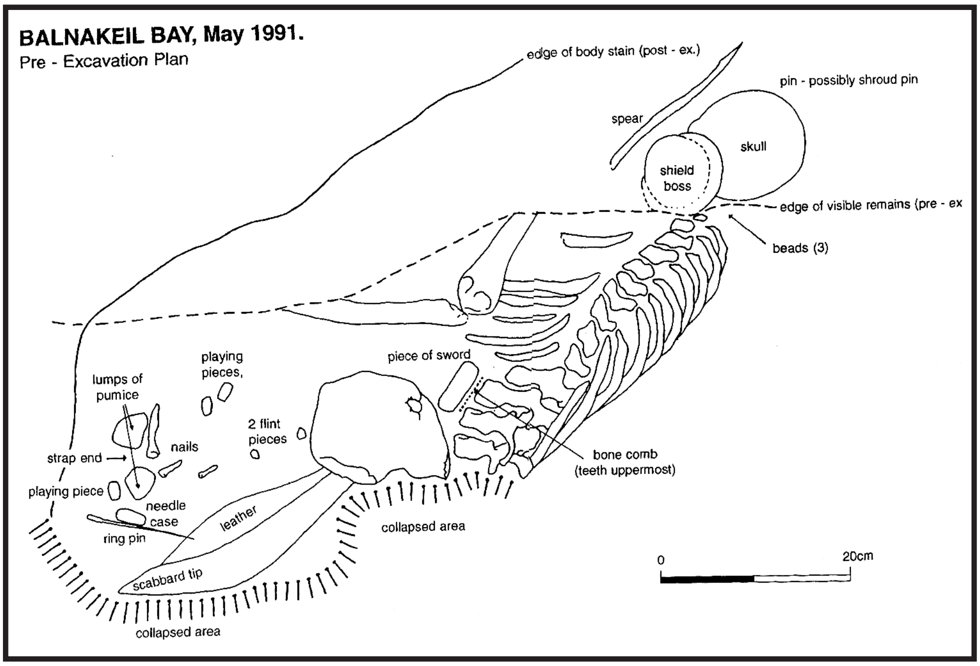

Figure 6.44, Artists Sketch of the Balnakeil Burial (Low *et al* 2000: 27).

scabbard, spear, shield, a bone comb, pumice and antler gaming pieces, three beads by the neck, two pins, flint, a strap end, a needle case, and nails. Such an extensively furnished burial is very rare, even in the so-called ‘Viking’ homelands (Crumlin Pedersen 1999, Gräslund 1980, Price 2002:91-232, Williams *et al* 2010). This makes this burial a singular find in Scotland and in the broader North Sea area. The grave goods have been dated 850-950 AD and radiocarbon places this grave at 660-940 Cal AD, 2σ (Fg 6.45).

Lab no.	$\delta^{13}C$ (AMS dating)	$\delta^{13}C$ (ultrafiltered)	$\delta^{15}N$ (ultrafiltered)	C:N	Est % marine carbon	Date bp	Mixed atmospheric/marine calibration, 95.4% range ($\Delta R = -79 \pm 17$)	Mixed atmospheric/marine calibration, 95.4% range ($\Delta R = 91 \pm 30$)
SUERC-2894	–19.70	–19.60	11.50	3.30	16	1350±35	640–830	650–890
SUERC-2895	–19.70	–19.60	11.50	3.30	16	1265±35	680–950	680–980
SUERC combined		–19.60	11.50	3.30	16	1308±25	660–870	660–940

Figure 6.45, Radiocarbon Dates for Balnakeil (After Barrett and Richards 2004: 256-7).

6.5 The Atlantic West

Scotland's western coast is a mass of long, craggy peninsulae, deep fjords, geos, and islands that span almost the entire coastline (Fg 6.46). The climate is mild and each island and peninsula has unique landscape (Butterworth *et al* 2010). There is abundant wildlife and marine resources, such as seals, rabbits, fish, and birds (Beaty and Jackman 1992, Gray 1871, Vaughan 1983). Additionally, proper topsoil cultivation produces viable and sustainable agriculture (Entwistle *et al* 1998). These qualities made this area worth fighting over in the maritime word of the early mediaeval North.

Territories changed hands quite often, and the exact boundaries are unknown. By the late 8th century, most of the coastal and island areas of the west are generally believed to have been part of the kingdom of Dal Riata (Fraser 2009). The most southwestern portion of the coast, roughly corresponding to the modern areas of Wigtownshire and Ayrshire, are understood to have been Brythonic until subsumed into the Anglo-Saxon kingdom of Bernicia in the 7th century (Woolf 2007).

Figure 6.46, The Atlantic West with Research Sites Indicated (Modified from Here 2015).

During the 9th century, the territory came under the control of the viking earls, eventually forming the Kingdom of Mann and the Isles (or the Lords of the Isles), with the Kingdom of Galloway emerging in the southwest in the 12th century (Oram and Stell 1991, Stringer 2005). Galloway was annexed into the Kingdom of the Scots shortly after the death of Alan, the Lord of Galloway, in 1234 (Brown 2004, Tuck 1986). The Kingdom of the Isles was ceded into the Scottish kingdom at the Treaty of Perth in 1266 (Calswell 2010, Stringer 2005).

6.5.1 Cnip

<u>Site Number</u>: NB03NE 15

<u>Curating Institution</u>: Museum nan Eilean

<u>Number of Individuals</u>: 7

<u>Age and Sex of Individuals</u>: See Table 6.13

Indiv	Age	Sex
A	Middle Adult	Probable Female
B	Middle Child	Indeterminate
C	Middle Adult	Male
D	Young Mid Adult	Male
E	Middle Adult	Female
F	Infant	Indeterminate
G	Neonate	Indeterminate

Table 6.13, Individuals Analysed from Cnip.
Age and Sex are Those Estimated by This Researcher.

Cnip is located on the Isle of Lewis in the Outer Hebrides (Fg 6.47). The site is also known as Chrip, Krip, Kneep, Krup, Knap, Bhaltos, Valtos, Traigh Na Berie, and Traigh Na Beirgh. In 1979, campers discovered a grave eroding out of the dune (Welander *et al* 1987). Excavation uncovered a

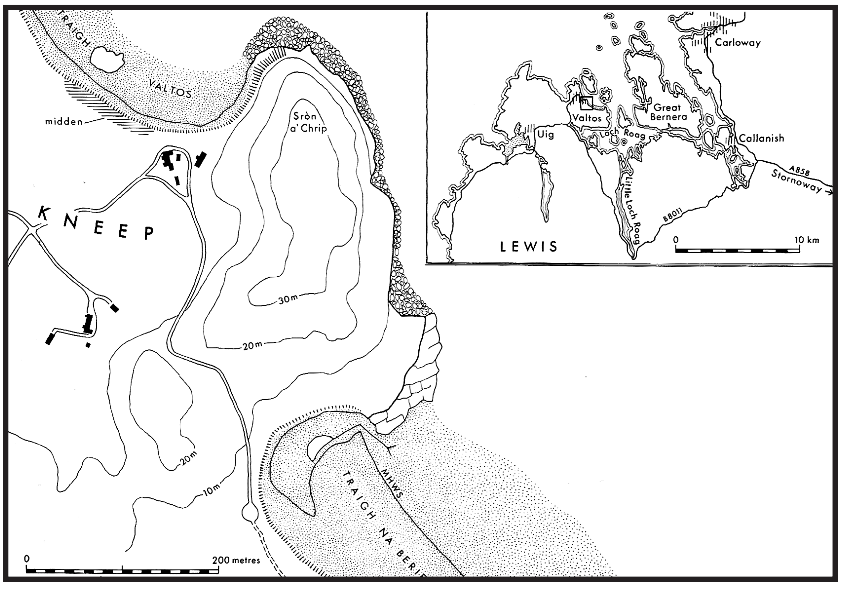

Figure 6.47, The Location of the Cnip Cemetery (Modified from Dunwell *et al* 1995: 721).

supine inhumation of 'Viking' style grave with female grave goods (Fg 6.48). The individual had been buried in a roughly east-west alignment; although it is unclear at which end the skull had been placed. The burial goods included a whetstone, bronze pin, a bone needle case, a knife, a sickle, belt fittings, an antler comb, beads, and two bronze oval brooches (Dunwell *et al* 1995, Welander *et al* 1987).

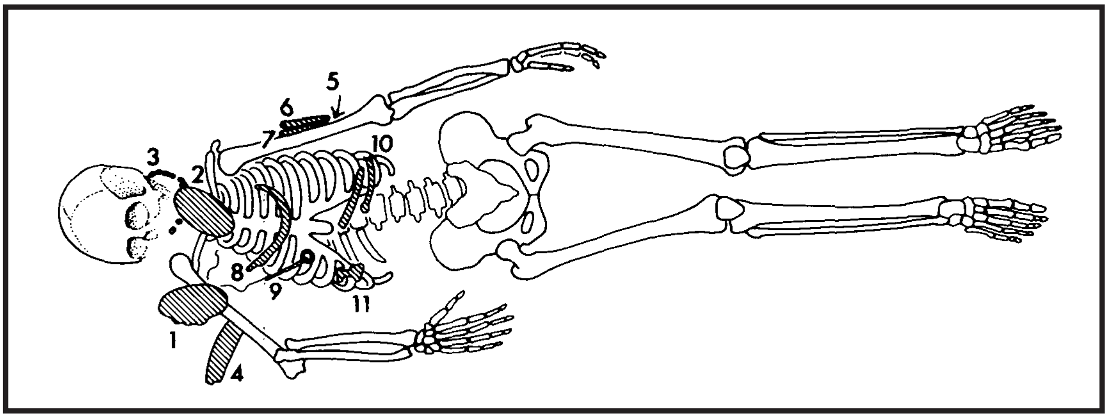

Figure 6.48, Artist's Reconstruction of Cnip A (Welander *et al* 1987: 152).

Increased erosion mobilised rescue efforts beginning in 1991 (Dunwell *et al* 1995). From 1991 to 1994, a further six individuals were discovered in the machair: three adults and three juveniles. All the graves were earthen. The adult graves were marked on the original soil surface by an outline of undressed stones. One juvenile, a middle child, had been covered by a boulder (Fg 6.49). There was no indication of surface markings for the other juveniles.

Two adults, sexed as males, were lying supine (Fg 6.50, Bruce & Kerr 1995). Skeleton C lay roughly east-west, with the head at the east. Skeleton D lay north-south with the head at the north. Skeleton E, sexed female, lay on her back, knees flexed and resting to the right (Bruce and Kerr 1995). The alignment was roughly east-west with the head at the east and tilted to the right. An infant, skeleton F, was supine in a northwest-southeast position with

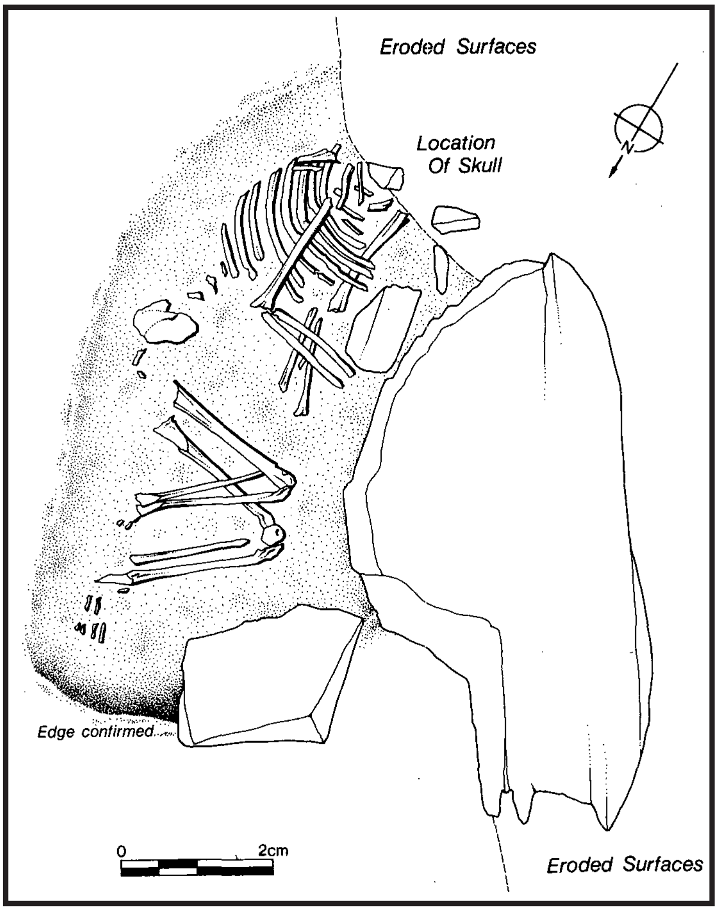

Figure 6.49, Middle Child Burial at Cnip (Dunwell *et al* 1995: 724).

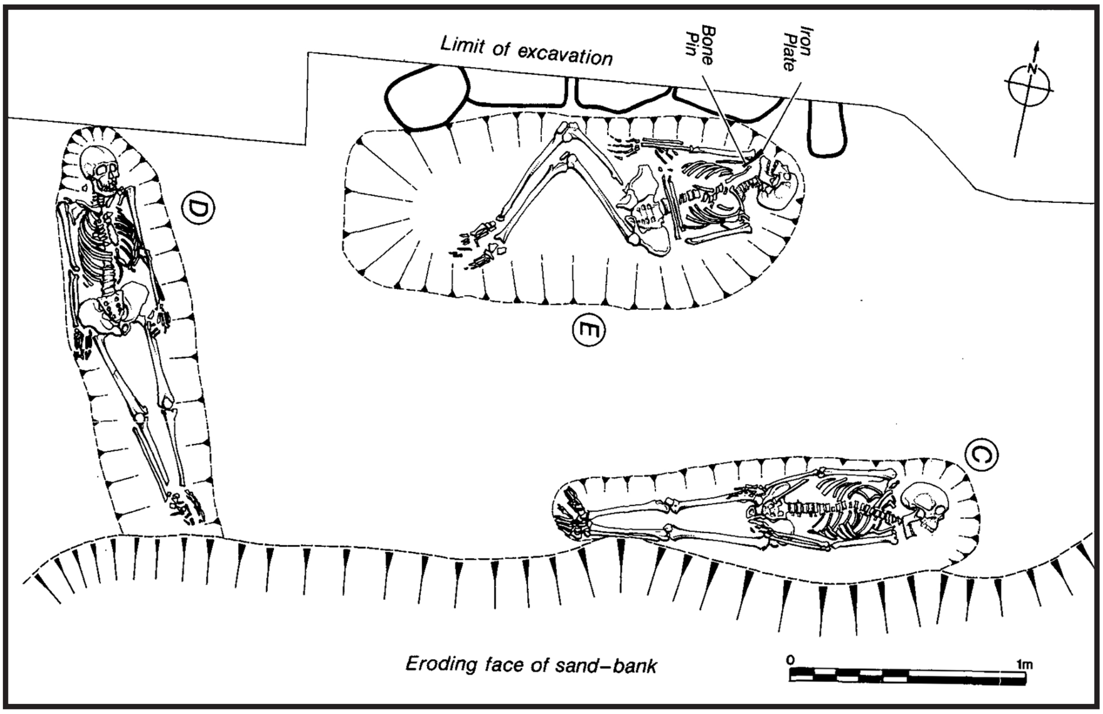

Figure 6.50, Position of Adult Graves from Cnip (Dunwell et al 1995: 730).

the skull at the northwest. The middle child (B) and the neonate (G) lay in a flexed position. The middle child was roughly north-south with the head at the north. The neonate lay east-west on the right side with the head at the west.

Grave good inclusions were minimal (Table 6.14). The middle child was deposited with an amber bead, a stone pendant, and three iron nails (Cowie *et al* 1993, Dunwell *et al* 1995). The origin of the nails is unknown. A corroded iron object, a probable nail, was discovered under the skull of the neonate. The female grave (E) included a perforated iron plate (possible pendant), and

Ind	Age	Grave Type	Body Position	Grave Goods	Source
A	Middle Adult	Earthen	Supine Extended	Whetstone Bronze Pin Needle Case Knife Sickle Belt Fittings Antler Comb Beads 2 Bronze Oval Brooches	Welander *et al* 1987
B	Middle Child	Earthen Stone Demarcation on Surface	Crouched On Left Side S-N	Amber Bead Stone Pendant 3 Iron Nails	Dunwell *et al* 1995
C	Middle Adult	Earthen Stone Demarcation on Surface	Supine Extended E-W	None	Dunwell *et al* 1995
D	Young Middle Adult	Earthen Stone Demarcation on Surface	Supine Extended NW-SE	None	Dunwell *et al* 1995
E	Middle Adult	Earthen Stone Demarcation on Surface	Supine Legs Flexed E-W	Iron Plate Bone Pin	Dunwell *et al* 1995
F	Infant	Earthen	Supine Extended	Bead	Dunwell *et al* 1995
G	Neonate	Earthen	Legs Flexed On Right Side W-E	Iron Nail?	Dunwell *et al* 1995

Table 6.14, Known Grave Types and Inclusions from Cnip.

a bone dress pin (Dunwell *et al* 1995). Two further beads and a bone pin were discovered in the sand fall, immediately prior to the excavation. The original association to the graves is unknown (Dunwell *et al* 1995).

Radiocarbon dates place the cemetery in the 9th to 10th centuries (Figure 6.51). Strontium isotopes suggest that only individuals D and E were raised somewhere other than the Hebrides (Montgomery *et al* 2003, Montgomery and Evans 2006).

Burial A
Sample no OxA-16468
Radiocarbon Age 1197 bp +/-35
Calibrated dates 1-sigma (68% prob.) cal AD 690 to 950
2-sigma (95% prob.) cal AD 720 to 970

Burial B
Sample no GU-3489
Radiocarbon Age 1150±50 BP
Calibrated dates 1-sigma (68% prob.) cal AD 870–973
2-sigma (95% prob.) cal AD 778–1006

Burial C
Sample no GU-3485
Radiocarbon Age 1150±50 BP
Calibrated dates 1-sigma (68% prob.) cal AD 870–973
2-sigma (95% prob.) cal AD 778–1006

Burial D
Sample no GU-3486
Radiocarbon Age 1200±50 BP
Calibrated dates 1-sigma (68% prob.) cal AD 778–891
2-sigma (95% prob.) cal AD 687–974

Burial E
Sample no GU-3487
Radiocarbon Age 1180±50 BP
Calibrated dates 1-sigma (68% prob.) cal AD 785–896; 913–956
2-sigma (95% prob.) cal AD 717–740; 763–985

Figure 6.51, Radiocarbon Dates from Cnip
(Modified from Dunwell *et al* 1995: 742-3, Montgomery and Evans 2006: 128).

6.5.2 Iona

Site Number: NM22SE4

Curating Institution: National Museums Scotland (3 Skulls)

Number of Individuals: 3 Analysed

38 Reported by Reece 1981

61 Reported by O'Sullivan 1994

Total Undetermined

Age and Sex of Individuals: See Table 6.15

Indiv	Age	Sex
1	Young Mid Adult	Prob Female
2	Mature Adult	Prob Female
3	Adult	Prob Male

Table 6.15, Individuals from Iona. Age and Sex are Those Estimated by This Researcher.

The Island of Iona lies in the Inner Hebrides, to the west of Oban, and adjacent to the Isle of Mull (Fg 6.52).

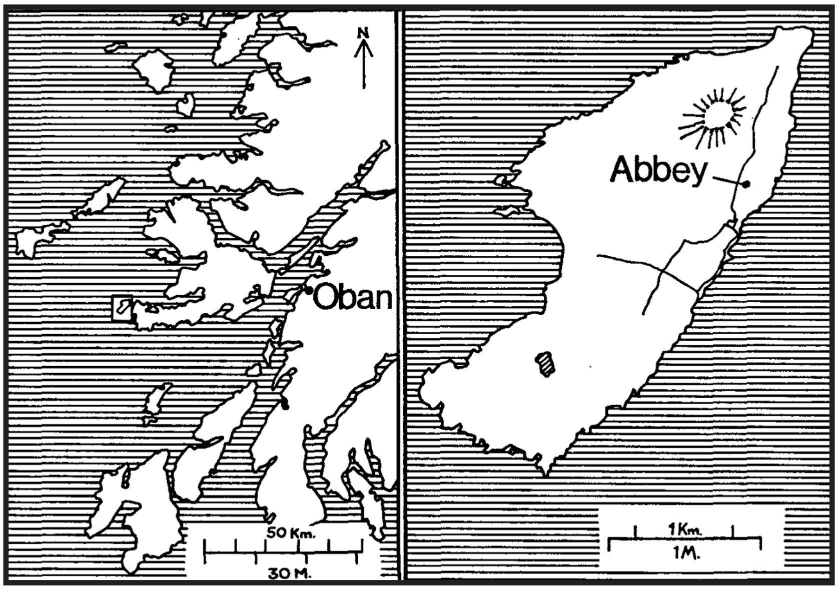

Figure 6.52, Location of Iona and the Abbey (Modified from Redknap 1977: 229).

According to the 7th century Vita Columbae, Columba founded the island's first monastery in 563 (Adamnan 1998). The Abbey became an active centre; prosperous enough to attract raiding vikings at the turn of the 9th century (Jennings 1998). Iona is a probable origin of the Book of Kells from where the manuscript would have been transferred to Kells for safe keeping (Jennings 1998, Meyvaert 1989).

The first excavation of the site began in 1956 (Reece 1981). In 1960-61, workmen disturbed human remains while laying water pipe (Reece 1981). Digging inadvertently progressed through a known mound on the site (NM22SE 142). Excavators were called in to rescue the disturbed graves. This portion of the excavation came to be known as Martyr's Bay (Fg 6.53).

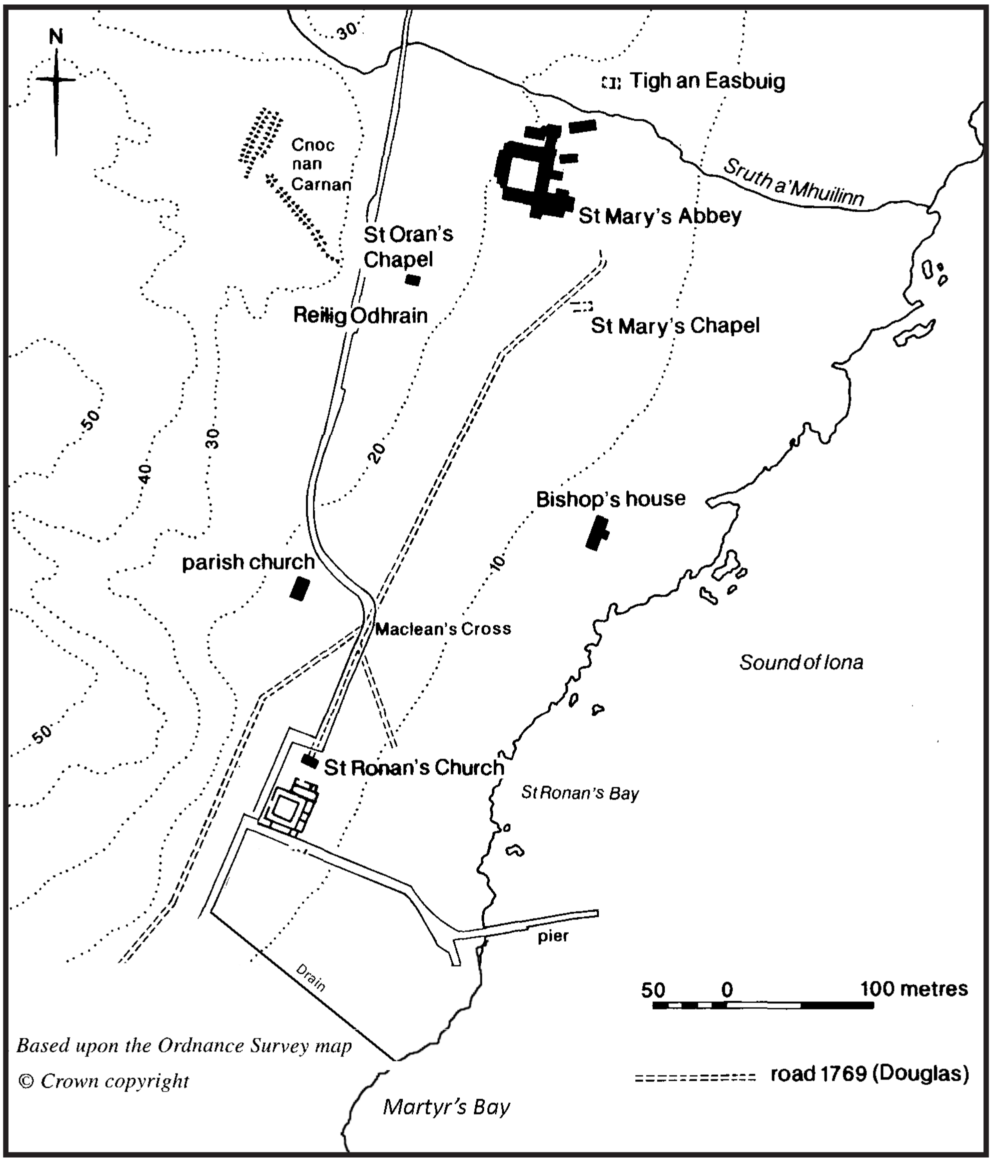

Figure 6.53, The Iona Abbey Complex (Modified from O'Sullivan 1994: 328).

Specific context for individual remains was not recorded. Instead, the bones were recorded in 'lots' (Reece 1981: 63-118). It was noted that many of the remains seemed to have been disturbed, were secondary deposits, or both.

The original two graves discovered are said to have been in a crouched position inside of schist cists (Reece 1981: 63); however, it is possible that the body positions—found later to be disarticulated—were misunderstood by the finders and that the 'cists' were actually natural outcrops of rock (Reece 1981: 65). No grave furnishings were discovered; although, one individual was found with a bronze strap (42x4x1mm) of unknown purpose (Reece 1981: 64).

St. Ronan's Church (NM22SE 51) lies at the north end of Martyr's Bay, next to an Augustinian nunnery. St. Ronan's itself is believed to be of 12-13th century in date (O'Sullivan 1994). The area was excavated in 1992 in advance of renovating the church into a museum. Early mediaeval graves were also discovered (Fg 6.54); however, the skeletal material was highly fragmented and poorly preserved. This precluded the ability to garner skeletal information,

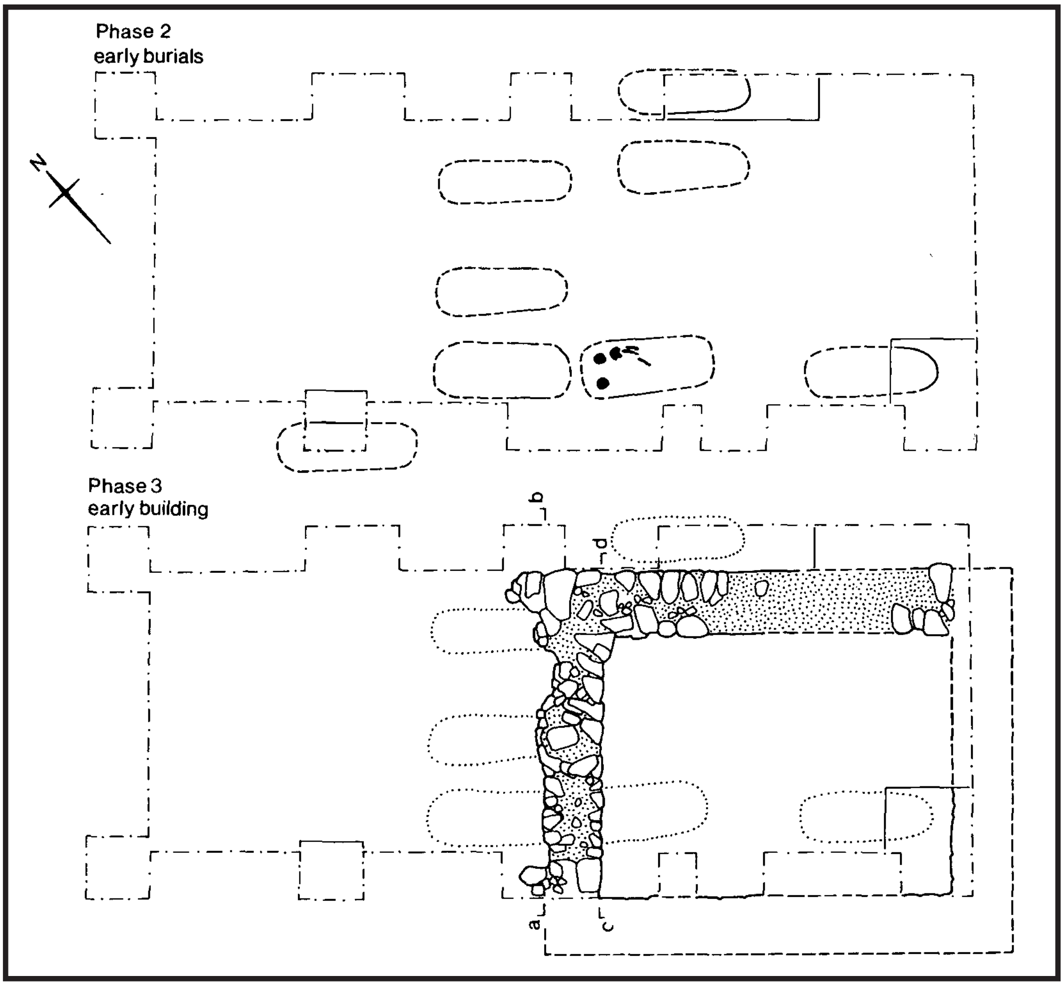

Figure 6.54, Early Mediaeval Graves from St. Ronans, Iona (O'Sullivan 1994: 330).

including the sex of the individuals. Burials were plain earthen graves, aligned southeast-northwest with no grave goods detected. Mediaeval and late-mediaeval graves were also discovered and these were primarily female. It is probable that this was the cemetery for the nunnery.

No demographic numbers were given for Martyr’s Bay; however, Calvin Wells states that ‘unless we make the quite unjustified decision that most of the Iona men had markedly gynaecoid (ie female pattern) pelves it is impossible to avoid the conclusion that women much outnumber the men in this population’ (Reece 1981: 86). In light of its proximity to the St. Ronan’s excavation, it is probable that the Martyr’s Bay cemetery was actually a portion of the St. Ronan’s burial ground (O’Sullivan 1994: 348).

Three skulls were available for analysis. No context information was presented with the remains; however, on one skull was written ‘A Present from Iona’. The packaging in which the skulls were curated was yellowed with age and it is possible that the skulls were from the Martyr’s Bay excavation.

6.5.3 Kiloran

Site Number: NR49NW 14

Curating Institution: National Museums Scotland

Number of Individuals: 1

Age of Individual: Adult

Sex of Individual: Probable Male

Kiloran Bay is located on the northwestern side of the island of Colonsay in the Inner Hebrides (Fg 6.55). In 1882, a mound in the machair was explored by Sir Malcolm McNeill (Anderson 1907, McNeill and Galloway 1883). It was partially excavated at that time, but the excavation was completed in 1883 by William Galloway. It was discovered to be a grave,

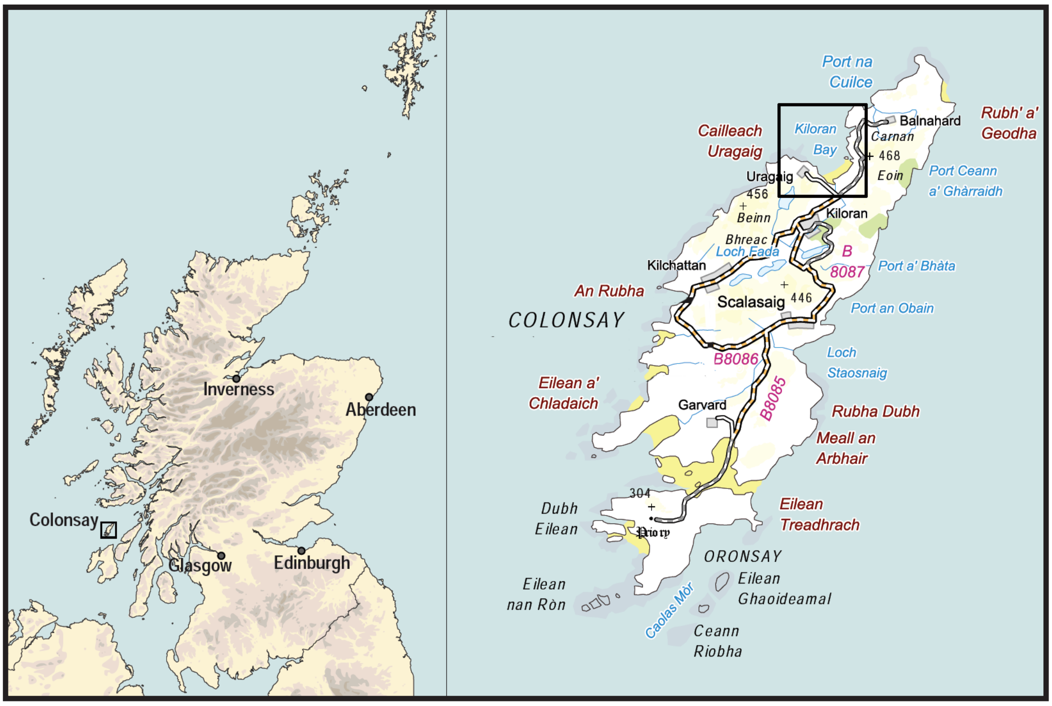

Figure 6.55, The Location of Colonsay and Kiloran Bay (Modified from Becket 2010: 4).

enclosed in a 15 x 10 foot cist (Fg 6.56). Two of the cist slabs had crosses chiselled into the surface. Throughout the sand were clinker nails, suggesting that some manner of wooden structure also enclosed the grave; which is generally assumed to be a boat (Anderson 1907, Müller-Wille 2007, RCAHMS 2016). Included in the grave was a set of scales with weights ‘of Irish origin’, a sword, shield and axe, and a strap end, bronze mount and buckle (Fg 6.57).

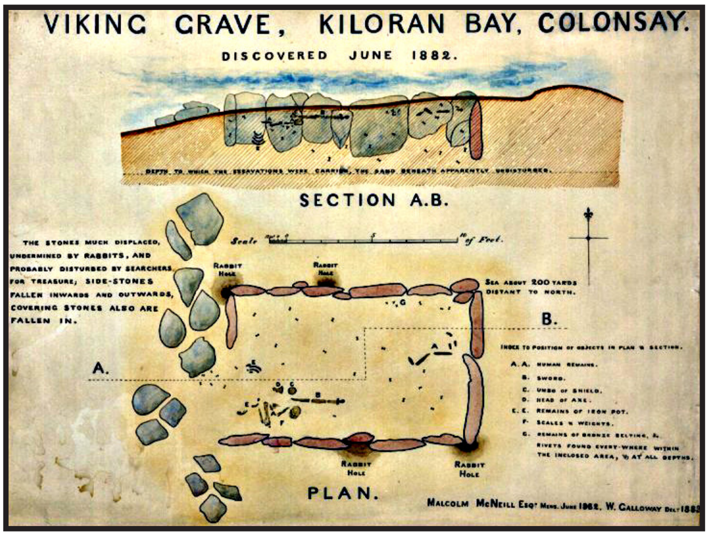

Figure 6.56, Kiloran Grave Illustration from Excavation Journal (McNeill and Galloway 1883).

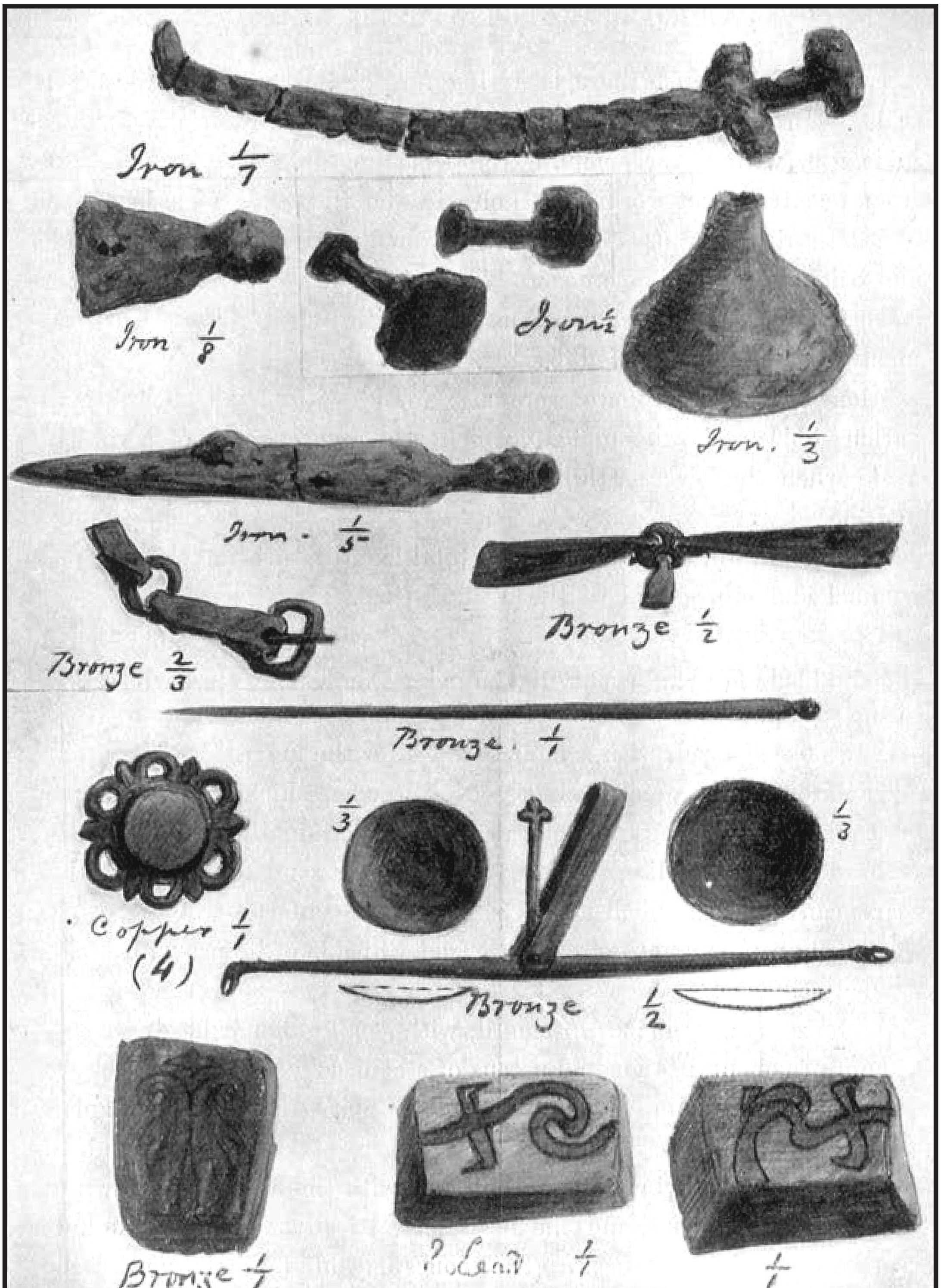

Fig. 9. Objects found in the Viking Grave-mound at Kiloran Bay. The sizes given on the drawing must here be read as reduced by about $\frac{1}{3}$.

Figure 6.57, Scale Drawings of the Goods from Kiloran (Anderson 1907: 446).

The only fragments of the skeleton remained; however, it was possible to determine that the individual was placed in a crouched position, on the left side in an east-west alignment. Towards the west end of the grave was a horse that had been lying on its right side. At the bottom of the cist were three Anglo-Saxon stycas from the mid-9th century. In keeping with the coin dates, radiocarbon dating of the horse bone places the burial at 780 to 1020 Cal AD, 1σ (OxA-6604, Uncalibrated date bp: 1110 +/- 45; 840 bc +/- 45, RCAHMS 2016).

6.5.4 St. Ninian's Point

Site Number: NS06SW 4

Curating Institution: National Museums Scotland

Number of Individuals: 9 Analysed

12 Reported by Aiken (1955)

Age and Sex of Individuals: See Table 6.16

Indiv	Age	Sex
1952	Middle Adult	Male
1952(1)	Mature Adult	Female
1952(2)	Adult	Indeterminate
1952(2b)	Adult	Indeterminate
1952(3a)	Mature Adult	Female
1952(3b)	Adult	Indeterminate
1952(56/13a)	Mature Adult	Indeterminate
1952(56/13b)	Mature Adult	Indeterminate
1952(56/13c)	Adult	Indeterminate

Table 6.16, Individuals Analysed from St. Ninian's Point.
Age and Sex are Those Estimated by This Researcher.

St. Ninian's Point is located on the west coast of Bute, directly opposing Inchmarnock in St. Ninian's Bay (Fg 6.58). The point is connected to Bute by a narrow strip of beach which occasionally becomes submerged by the sea (Aitken 1955). The chapel is located in the middle of the promontory and

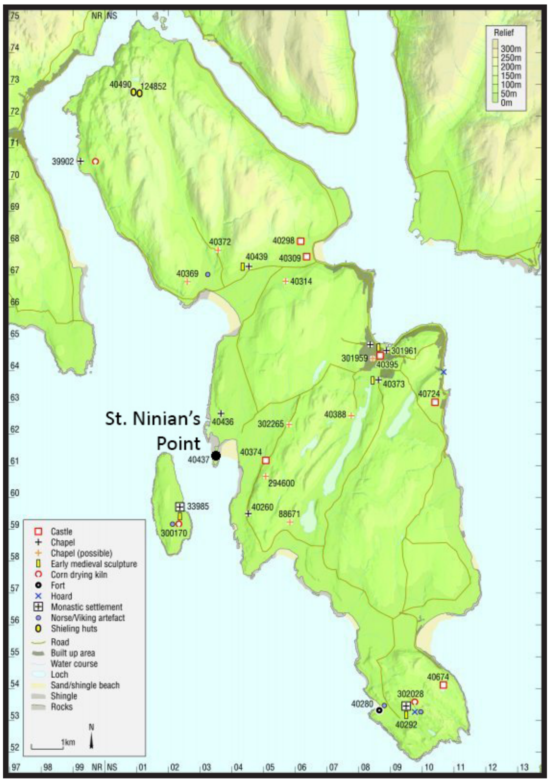

Figure 6.58, Bute with St. Ninian's Point Indicated (Modified from RCAHMS 2016).

was, at one point, surrounded by a circular enclosure (Fg 6.59). Almost nothing was known about the chapel site until the excavations. However, the site is visible from Inchmarnock and this could suggest a link to the larger monastic site (Lowe 2008). Aitken (1955) suggests a terminus post quem of the 9th century.

The site was excavated in 1952 and 1954 (Aitken 1955, RCAHMS 2016). An inhumation was discovered in front of the stone altar. The individual had been placed in a 'natural hollow' in an east-west alignment (Aitken 1955). A small strip of bronze was found in the grave.

Eleven other burials were excavated outside the chapel (Aitken 1955, RCAHMS 2016). One of these was outside the enclosure wall. The individuals had been laid supine and extended Most were oriented east-west; however, one was northeast-southwest and two were north-south (Fg 6.60). The burial outside the enclosure yielded part of a jet armlet. No other grave furnishings were discovered during the excavation.

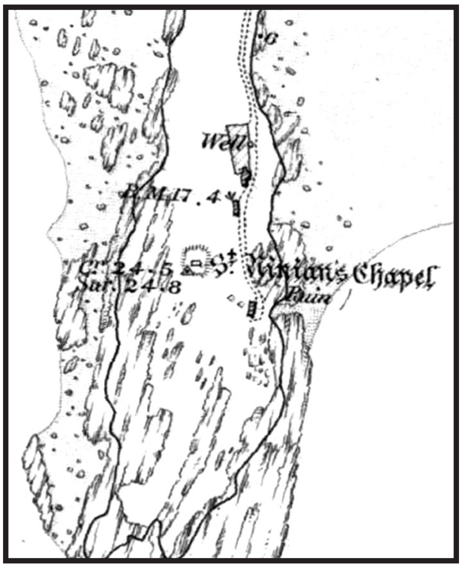

Figure 6.59, St. Ninian's Point with Church Indicated (RCAHMS 2016).

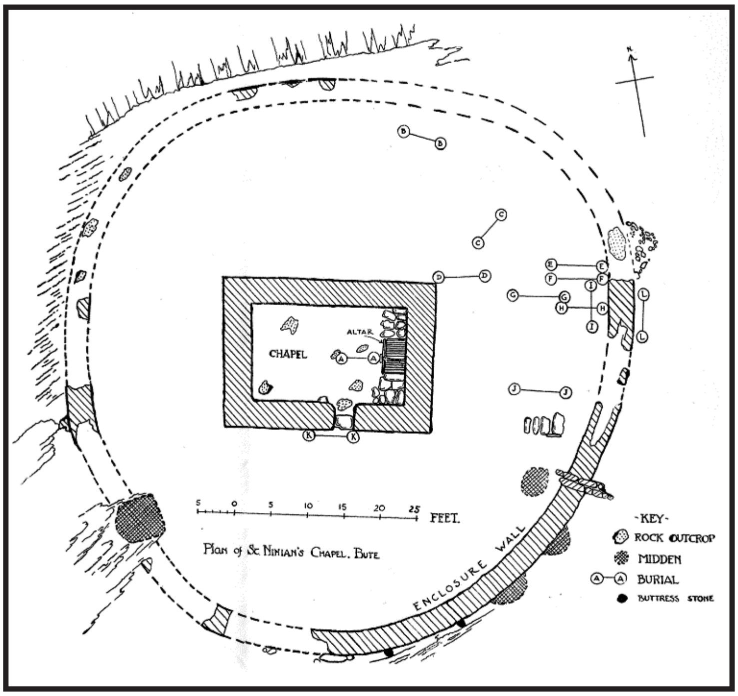

Figure 6.60, Sketch of the St. Ninian's Kirk Excavation (Aitken 1955: 78).

Nine individuals were available for analysis in this research. Unfortunately, the curation codes on the boxes did not correspond with the coding system of the excavators; therefore, it is unknown which individuals were discovered in which context.

6.6 Cumbria

Cumbria lies at the very northwestern portion of modern England, abutting the modern Scottish county of Galloway (Fg 6.61). There is some dispute as to the exact nature of the political and ethnic standing in the early mediaeval period. At the end of the 8th century, the area had either been subsumed into the Northumbrian kingdom, or held some type of alliance with Northumberland (Clarkson 2012, McCarthy *et al* 2014a). Linguistically, and possibly culturally, there is evidence to suggest that southwestern area of Scotland and Cumbria were one region: Alt Clut or Strathclyde (Barrow 1966, Clarkson 2012, Stringer 2005). By the time of the Norman Conquest, most of modern-day

Figure 6.61, Map of Cumbria in Relation to Southern Scotland (Modified from Here 2015).

Cumbria was under the auspices of the Scottish crown and excluded from the Domesday Book (Summerson 2004). In 1092, William Rufus (William II of England) commandeered Carlisle, an action which eventually led Malcolm III of Scotland to attack Northumberland (Scott 1997). The Treaty of Falaise (1174) installed a border between England and Scotland that relatively resembles the modern one; however, Cumbria would continue to be lost and retaken by both the Scottish and English crowns throughout the Scottish Wars for Independence (Davies 1996, Sadler 2006, Wormald 2005).

6.6.1 Carlisle Cathedral

Site Number: SMR 5309

Curating Institution: Dean and Chapter of Carlisle Cathedral

Number of Individuals: 7 Analysed

41 Reported by Gaimster *et al* (1989)

Total Unknown

Age and Sex of Individuals: See Table 6.17

Indiv	Age	Sex	Indiv	Age	Sex
7	Middle Adult	Male	44	Mature Adult	Prob Female
14	Middle Adult	Male	54	Mature Adult	Male
14 Assoc	Adult	Indeterminate	56	Mature Adult	Male
17	Young Middle Adult	Prob Female			

Table 6.17, Individuals Analysed from Carlisle Cathedral.
Age and Sex are Those Estimated by This Researcher.

The city of Carlisle lies at the confluence of the Eden, Caldew and Petteril rivers, just 16 km (10 m) south of the Scottish border (Fg 6.61). The city began as a Roman civitas, *Luguvalium* (McCarthy 2004, McCarthy *et al* 2014b, Summerson 2004). A nunnery attributed to St. Cuthbert is mentioned by Bede in 685; although, it is unclear exactly where this was located (English Heritage 2007, McCarthy 2004). This eventually included a school and a separate monastery (McCarthy *et al* 2014b). Per John of Worcester (1998), the city was attacked by vikings and then abandoned for 200 years until William Rufus began construction of a motte and bailey in 1093 (McCarthy *et al* 2014b). However, modern excavations have found no evidence of this. In 1122, construction of the stone castle began (Summerson 2004), in addition to the priory of St. Mary 300 metres to the southeast (Fg 6.62, English Heritage 2007). The Cathedral itself was founded in 1133 (Summerson 2004).

In 1988, excavation was undertaken prior to the construction of an underground treasury at the Cathedral (Buckberry 2009, English Heritage

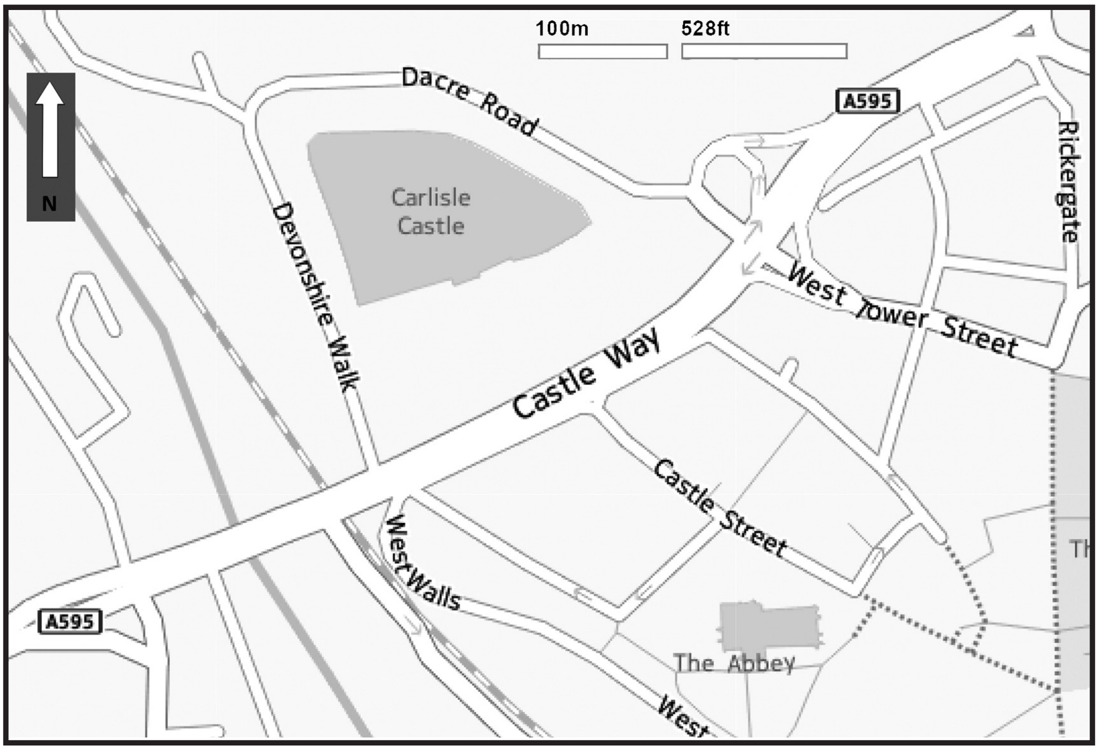

Figure 6.62, Carlisle Castle and Cathedral, 'The Abbey' (Modified from Here 2015).

2007, Gaimster *et al* 1989, McCarthy *et al* 2014a, 2014b). Six trenches were dug (Fg 6.63); the largest (G) revealed a crowded cemetery (McCarthy *et*

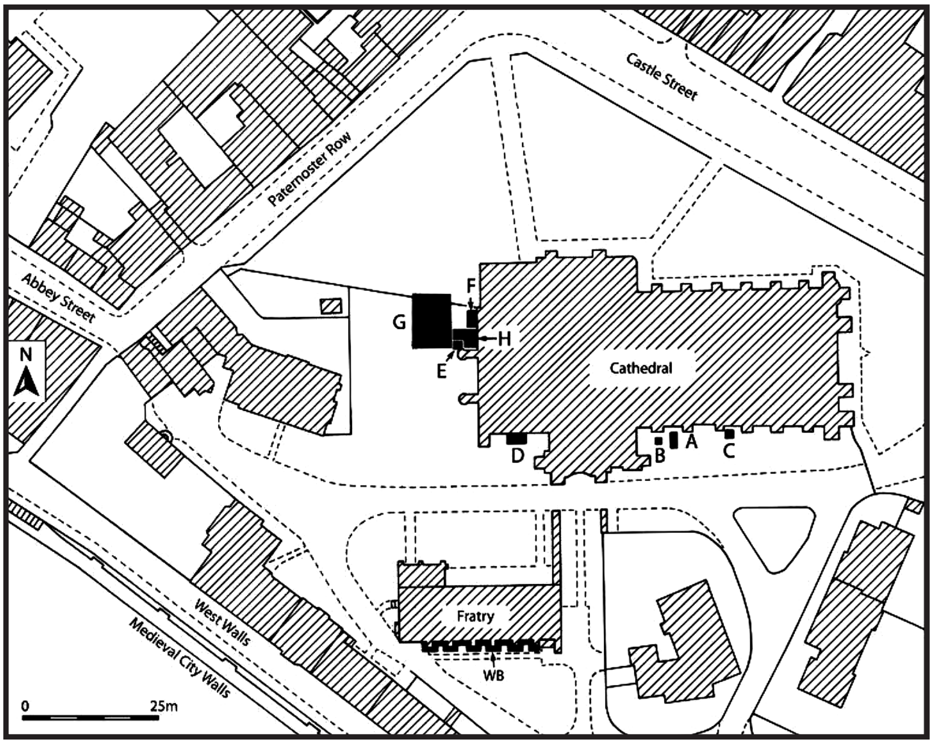

Figure 6.63, Plan of Excavation Trenches A-E (McCarthy *et al* 2014a: 189).

al 2014a). Forty-one inhumations were reported by Gaimster *et al* (1989) and English Heritage (2007); however, the initial skeletal report by Flinn (nd) discusses 51 burials and 'various' disarticulated remains. Nineteen individuals were retained for further analysis (Buckberry 2009). The additional human remains were reburied at the request of the Dean and Chapter of Carlisle Cathedral.

The long term use of the site produced a series of overlapping and intercutting graves, making reconstruction of the original burial environment problematic (Fg 6.64). The graves which were relatively distinct were rectangular and earthen with vertical sides and flat floors (McCarthy *et al* 2014a). A sandstone slabs had been used in a few of the graves along with one cist; however, which particular individuals these were associated with was not indicated by the excavators. Post-mediaeval individual SK27 was the only burial with pillow stones (McCarthy *et al* 2014a). Alignment was generally supine and west-east but a few were aligned northeast–southwest

Again, which individuals were aligned in which direction was not reported (McCarthy *et al* 2014a). Grave goods included 10th century buckles, an

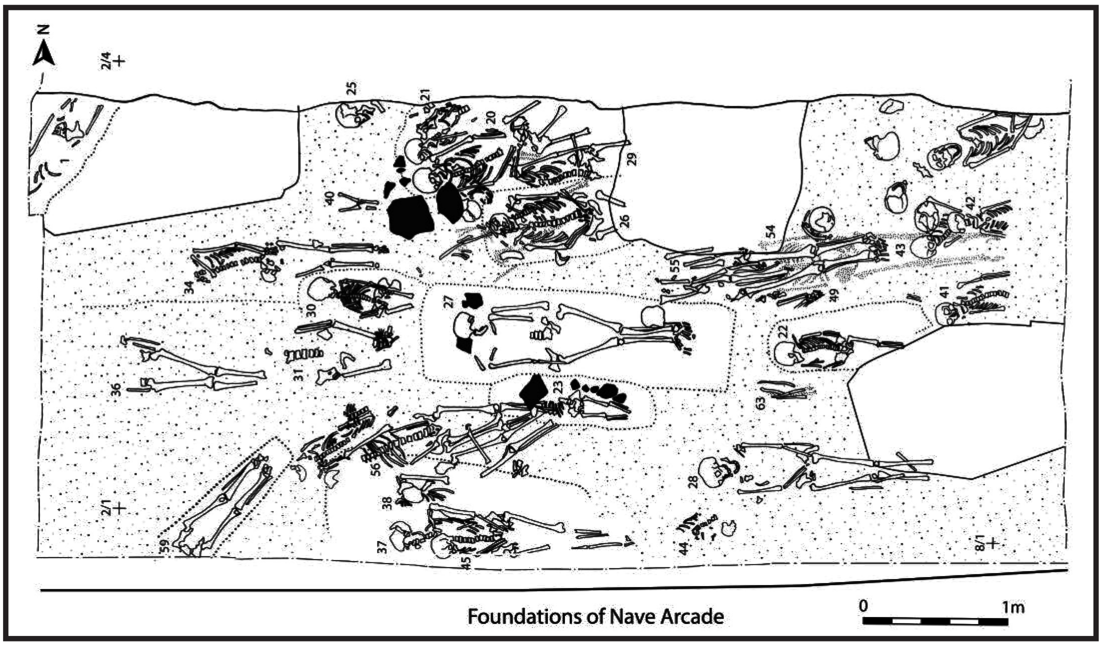

Figure 6.64, Sketch of Burial Layout at Carlisle (McCarthy *et al* 2014a: 197).

antler comb, iron knives, a 9th century strap-end, and a pendant whetstone (McCarthy *et al* 2014a, McCarthy 2004).

Of the 19 individuals available for this research, only three yielded radiocarbon dates which placed them within the confines of this thesis (Fg 6.65). A further three graves, a total of four additional individuals, could reasonably be assumed to comply to the time frame based on stratigraphy. Individual 54 is the only individual linked to grave goods which may have a Norse connotation: the antler comb, the pendant whetstone, a knife, a strap-end, and a silver loop (McCarthy *et al* 2014a, 2014b).

SAMPLE NO.	MATERIAL	RADIOCARBON AGE	ERROR	$\delta^{13}C$	% MARINE DIET	CALIBRATED DATE RANGE AT 95% CONFIDENCE (AD). NO MARINE CORRECTION	CALIBRATED DATE RANGE AT 95% CONFIDENCE (AD). CORRECTED FOR MARINE CONTRIBUTION
CAR 07	Collagen from dentine	1155	30	-20.1	11	770–980	810–1020
CAR 44	Collagen from bone (rib)	1040	30	-20.3	8	890–920 (7.1%) 940–1040 (88.3%)	970–1160
CAR 54	Collagen from bone (rib)	1135	30	-19.1	22	780–790 (1.5%) 810–990 (93.9%)	880–1040

Figure 6.65, Radiocarbon Dates from Carlisle (Modified from McCarthy *et al* 2014a: 239).

6.7 South-East: Lothian and the Borders

After the Ice Age, much of southeast Scotland (Fg 6.66) was covered in dense forest (Hay *et al* 2000). It is unclear at what point people began clearing the land; however, by the beginning of the 13th century, most of the land had been rendered treeless, either for agriculture or sheep grazing.

By the 7th century, southeastern Scotland had been annexed into Northumberland (Clarkson 2012, Woolf 2007). In the mid-10th century, the Scottish king, Indulf, took the fortress at what is today Edinburgh, and most of the area fell under the Kingdom of the Scots from that point on (Woolf 2007).

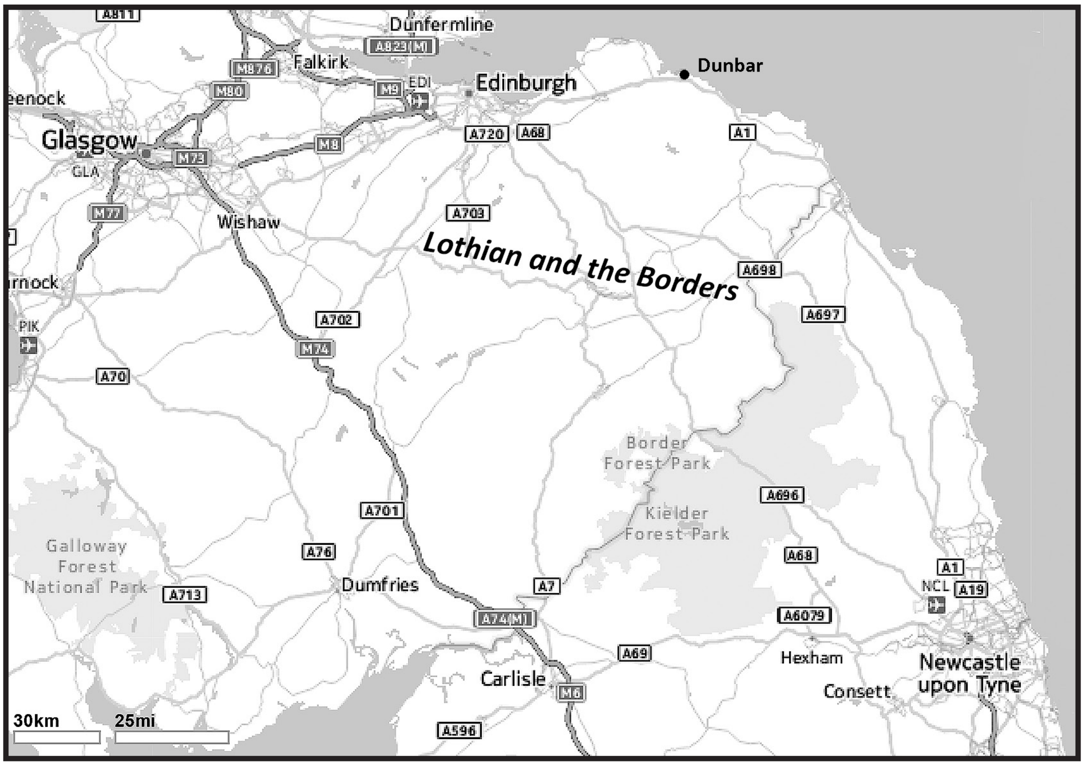

Figure 6.66, The South-East with Research Site Indicated (Modified from Here 2015).

As with Cumbria, the exact border between England and Scotland would continue to fluctuate until the late 15th century (Caldwell 1988, Sadler 2006).

6.7.1 Captain's Cabin, Castle Park

Site Number: NT67NE 473

Curating Institution: National Museums Scotland

Number of Individuals: 76 Analysed

76 Reported by Roberts (Moloney *et al* 2001)

47 Reported by Perry *et al* (2000: 283-311)

Total Cemetery Population Unknown

Age and Sex of Individuals: See Table 6.18

Indiv	Age	Sex
004	Adult	Female
1	Adult	Indeterminate
2	Young Mid Adult	Female
3	Young Child	Indeterminate
4	Mature	Female
5	Neonate	Indeterminate
7	Adult	Indeterminate
8	Young Mid Adult	Indeterminate
9	Middle Adult	Prob Male
10	Middle Child	Indeterminate
11	Infant	Indeterminate
12	Mature Adult	Prob Female
12assoc	Middle Child	Indeterminate
13	Adolescent	Prob Female
14	Mature Adult	Male
15	Mature Adult	Female
15assoc	Old Child	Indeterminate
16	Adult	Indeterminate
17	Adult	Indeterminate
18	Adult	Indeterminate
19	Adolescent	Indeterminate
20	Middle Adult	Female
21	Middle Adult	Male
22	Old Child	Indeterminate
23	Infant	Indeterminate
24	Young Mid Adult	Female
25	Early Adult	Prob Male
26	Middle Child	Indeterminate
27	Infant	Indeterminate
28	Middle Child	Indeterminate
29	Young Mid Adult	Prob Male
30	Infant	Indeterminate
31	Neonate	Indeterminate
32	Young Child	Indeterminate
33	Adult	Female
35	Young Child	Indeterminate
36	Adult	Prob Male
37	Middle Child	Indeterminate

Indiv	Age	Sex
38	Young Mid Adult	Male
39	Adolescent	Indeterminate
40	Adult	Indeterminate
41	Old Child	Indeterminate
42	Middle Child	Indeterminate
43	Neonate	Indeterminate
44	Mature	Female
44b	Adult	Male
45	Middle Adult	Male
46	Young Mid Adult	Female
47	Young Child	Indeterminate
49	Middle Adult	Prob Female
50	Infant	Indeterminate
51	Infant	Indeterminate
52	Adult	Female
53a	Adolescent	Male
53b	Young Mid Adult	Female
54	Adolescent	Prob Female
55	Middle Adult	Male
56	Mature Adult	Female
57	Middle Adult	Prob Female
58	Adult	Prob Male
59	Adolescent	Female
60	Adult	Indeterminate
61	Adult	Male
62	Middle Adult	Male
63	Old Child	Indeterminate
64	Young Mid Adult	Female
66	Young Child	Indeterminate
67	Young Child	Indeterminate
68	Mature Adult	Female
69	Neonate	Indeterminate
70	Adult	Prob Female
71	Early Adult	Prob Male
72	Mature Adult	Male
73	Old Child	Indeterminate
74	Middle Child	Indeterminate
75	Infant	Indeterminate

Table 6.18, Individuals Analysed from Captain's Cabin.
Age and Sex are Those Estimated by This Researcher.

Castle Park is a pool and leisure centre located immediately south of Dunbar Castle in East Lothian (6.67).

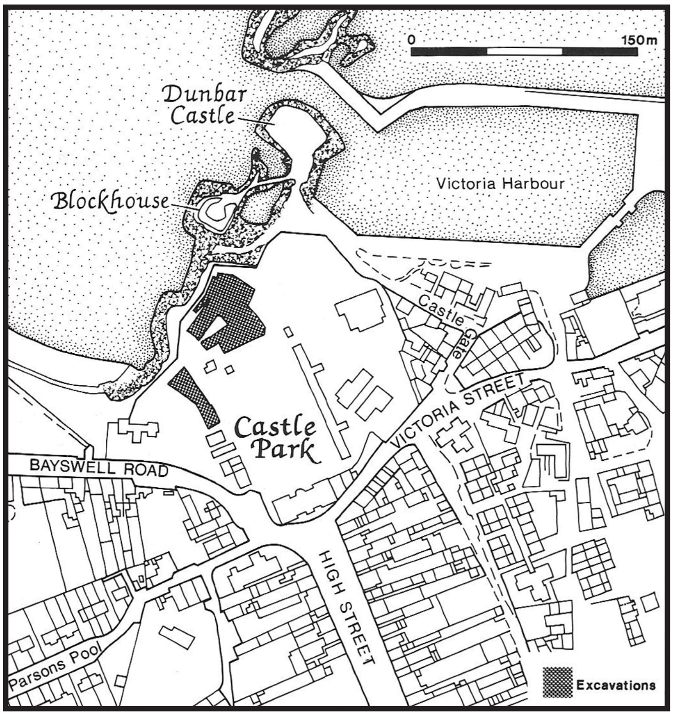

Figure 6.67, Location of Castle Park (Perry et al 2000: xviii).

In 1987-93, prior to the centre's erection, exploratory and eventual trench excavations were undertaken (Perry *et al* 2000). Further excavations were undertaken in 1998 prior to the construction of a toilet block for the centre, named the Captain's Cabin (Fg 6.68).

A cemetery was first identified in 1801 when workers unearthed 'numerous' human bones (Carfrae 1803, RCAHMS 2016). However, no further excavations were undertaken until the watching briefs for the leisure centre. The work undertaken by Perry *et al* (2000) revealed evidence of Iron Age and relatively continuous habitation through to the present day. The final year of this excavation revealed a minimum of 47 burials (26 cist and 21 earthen), of which, only 16 were excavated. The 1998 Captain's Cabin excavation by Moloney *et al* (2001) yielded a further 76 individuals: all excavated. It is the latter 76 individuals who were available for analysis in this thesis.

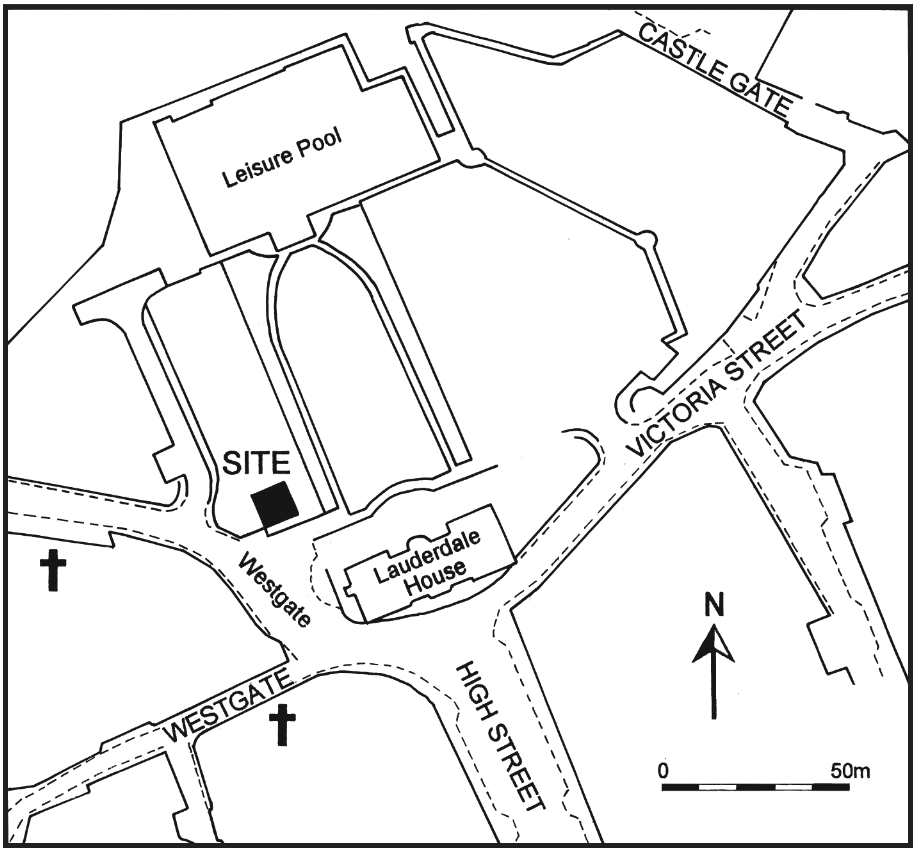

Figure 6.68, Captain's Cabin Excavation Site at Castle Park (Moloney *et al* 2001: 284).

The majority of the Captain's Cabin inhumations were in plain earthen graves in a general east-west alignment (Moloney *et al* 2001). Several of these had an arrangement of stones supporting the skull. Four long cists were also identified although only one of these was complete. Radiocarbon dating (Fg 6.69) places the Captain's Cabin burials in the 10th to 13th centuries. In all excavations, grave good inclusion was minimal; although, a letter regarding the antiquarian excavation mentions one grave with remnants of leather and

Lab No	*Reference*	*Delta 13C rel PDB*	*Radiocarbon Age* BP	*Calibrated age ranges* 1σ	2σ
GU-8652	SK21	-21.1%	980 ± 50	cal AD 1003–1155	cal AD 981–1186
GU-8653	SK15	-18.2%	920 ± 50	cal AD 1028–1206	cal AD 1018–1222
GU-8654	SK22	-18.6%	970 ± 50	cal AD 1018–1157	cal AD 983–1207
GU-8655	SK26	-20.2%	7406 ± 50	cal AD 1259–1294	cal AD 1214–1382
GU-8656	SK44	-19.9%	8806 ± 50	cal AD 1043–1219	cal AD 1024–1264
GU-8657	SK45	-20.4%	9306 ± 50	cal AD 1024–1184	cal AD 1002–1219
GU-8658	SK59	-19.5%	9206 ± 60	cal AD 1024–1209	cal AD 999–1257
GU-8659	SK67	-18.9%	980 ± 50	cal AD 1003–1155	cal AD 981–1186

Figure 6.69, Radiocarbon Dates for Captain's Cabin. (Modified from Moloney *et al* 2001: 285).

an additional quantity of stone balls of various sizes which were ‘rounded by art’ (Carfrae 1803).

The location of the cemetery in proximity with the castle is suggestive that it was linked to the fort. It is unclear when Dunbar Castle was erected. The word ‘dunbar’ has a brythonic-gaelic origin and means fort-headland (Dwelly 1911, Royal Irish Academy and Queens Unversity Belfast 2013). The first historical mention of the town is in 680 in the Life of Wilfrid (Moloney *et al* 2001, Stephanus 1985). This suggests that there was some sort of defensive structure by the end of the 7th century. Dunbar remained a stronghold until well into the early modern period (Dennison *et al* 2006, Perry *et al* 2000).

6.8 Conclusion

This chapter has given an overview of the sites examined in this research. The next chapter will detail the results of the actual analysis.

CHAPTER 7

The Mortuary Environment

7.1 Introduction

The first chapter of this thesis recounted the initial research direction of the bioarchaeology of 'Scottish Vikings' and the subsequent realisation that this terminology is by no means well defined or well understood. Chapter 3 delineates some basic concepts behind modern mortuary theory and their application to the concept of burial in the early mediaeval North. In, seemingly parallel, research areas such as Anglo-Saxon England and in the early mediaeval Germanic areas on the European continent, this type of narrow and compartmentalised view of identity has been—and continues to be—critiqued, criticised, and in some cases, abandoned (see Curta 2011, Härke 2011, 1997, Jones 1997, Petts 2011, 2000, Sayer 2013, Sayer and Williams 2009a, 2009b for some examples).

Within the study of early mediaeval Scotland, there are two main concepts which have traditionally been taken as doxa (Section 1.5), along with their closely related sub-principles:

1) There are Christians and pagans
    a) each is buried in its own, distinct way.
    b) each leads a different type of life, suggesting a different biological phenotype
2) There are natives and Norse.
    a) In the beginning, each is buried in its own way. At the end there is much crossover, but there is still enough difference to see an 'ethnological' separation.

b) These groups are biologically distinct.

While the theoretical framework behind modern mortuary and biocultural studies suggests that such suppositions are ‘at best an exaggeration and at worst evidence of theoretical malaise’ (Curta 2011: 540), this doxa *has not been tested* within the area of early mediaeval Scotland. Some researchers in other research areas have essentially abandoned such narrow concepts; however, this idea of an uncomplicated and easily distinguished ‘identity’ (in the form of, say, ‘Norse’ or ‘pagan’) is still *very much in use* with early mediaeval Scottish researchers.

This is not to imply that all researchers are using such a processualist concept, nor that this occurs every time. However, the critique of this narrow thinking is far from exhaustive as concerns early medieval Scotland. Upon investigation, it is suspected by this researcher that use this compartmentalised version of identity will prove incongruous as the complexities of being human are acknowledged. However, this is not now the case. The ‘religious’ and ‘ethnic’ doxa needs to be *thoroughly* tested to prove or disprove its validity. This was an aim of this thesis as presented in the Introduction (Section 1.5).

For the sake of this analysis, the categorical divisions above are assumed accurate, with all assays proceeding from this position. Therefore, the two main sections which follow (Sections 7.2 and 7.3) discuss the sites by religion (‘Christian’ and ‘pagan’) and by ethnicity (‘native’ and ‘Norse’). In many cases, site documentation was incomplete or non-existant. Therefore, a sophisticated, quantitative analysis of the mortuary landscape was not possible, and an exploration of many commonly tested questions such as spatial analysis or grave orientation were infeasible and thus, not attempted.

Categorical determinations as to ‘religious’ or ‘ethnic’ designation were made for the site as a whole and not by individual grave. This was done because: 1). documentation was not available to establish ‘classifications’ for individual graves, 2). within the research area, sites tend to be ‘classified’ and regarded as a whole. Iona, for instance, is a ‘Christian’ site (McCormick *et al* 1988, O’Sullivan 1994, Reece 1981), while Scar is ‘pagan’ (Owen 2004). This is not to suggest that researchers are not aware of individual agency within funerary ritual; however, within the study of early mediaeval Scotland, mortuary sites tend to be discussed as if one categorical group. Therefore, the inability to perform a grave by grave analysis became a way to test a common practice within the discipline.

Lastly, although there was not enough information to perform the in-depth, multivariate analyses that were originally hoped for when this study was begun, there was enough information to gain a qualitative sense of the sites. This ‘sense’ has been included in the third section (7.4) which separates the sites by cemetery type. This is *not* based on a common doxa as to how early mediaeval Scottish burial should ‘look’; but on the general impression this researcher has gained from working with the data.

7.2 Burial Form by Religion

Grave forms in early mediaeval Scotland are commonly divided into ‘pagan’ and ‘Christian’. At the beginning of the 8th century, traditional narratives assert that Scotland was ‘Christian’ (Clancy 2004, Foster 2004, Woolf 2007). At this time, ‘Vikings’ began settling in Atlantic and Island Scotland (Crawford 2000, 1995, Graham-Campbell and Batey 1998, Ritchie 1993). According to source material, these ‘Vikings’ were ‘pagan’ (Barrett and Richards 2004, Graham-Campbell and Batey 1998). This concept has encouraged the binary pagan-Christian division of burial forms. There is a growing collection of literature criticising the binary concept of pagan-Christian

(Maldonado Ramírez 2013, Petts 2011, 2000, Schüke 1999); Therefore, testing the validity of this pagan-Christian division in Scottish archaeology is one of the key points to this research.

First, it must be established what a ‘Christian’ and a ‘pagan’ burial is purported to ‘look’ like. In the study of early mediaeval Scotland, the basic criteria are as follows:

‘Christian’ Burial (see 3.1)

1) East-west alignment of grave and body.
2) Body in supine and extended position.
3) Grave only large enough for body and ‘coffin’.
4) Little to no grave goods (‘none’ preferred).
5) ‘Obviously Christian’ goods accepted: crosses, ‘pilgrims staffs’, etc.
6) Possibly near to a Christian ecclesiastical structure.

‘Pagan’ Burial (see 3.5)

1) Possible north-south alignment of grave and body.
2) Possible body crouched, flexed, or prone.
3) Weapons (male graves)/Jewellery (female graves).
4) Possible other grave goods, including animals.
6) Possible boat or chamber as enclosure.

The above check-lists are problematic even with a cursory reading. Christian grave alignment, for example, is believed to be east-west with the head at the west (Driscoll 1989, Quinney 2007, Stevens *et al* 2005). There is, however, nothing to suggest that is the case. Church did not define specifications for corpse disposal (see 3.1). This included (or did not include) the direction to which the corpse should be aligned. In fact, 3.6% of the graves at the ‘Christian’ cemetery on Omey Island were *distinctly* off the east-west axis, including north-south (O’Keefe 1992, Scott 2011: 63). ‘Pagan’ graves also occur on the east-west axis. For example, Zugaiar (2012:12) found five of the 32 Icelandic ‘pagan’ graves (15.6%) were aligned on an east-west axis; with an additional four oriented west-northwest–south-southeast or vice-versa. This makes 28.12% of the ‘pagan’ burials which were aligned in the ‘Christian’ way.

Doxa holds that Christians are buried in this manner to face the resurrected Christ, who will appear with the rising sun at the second coming (Rahtz 1978: 4). Some researchers have thus found it troubling that the bulk if the early mediaeval ‘Christian’ cemeteries in Britain and Ireland regularly fall off axis and are inconsistent in which direction they are off. For example, Russell found the median axis for 25 British cemeteries: 4 are north-east, 12 are east-northeast, 8 are east-west, and 1 was east-southeast (Rahtz 1978: 10). At Cannington, Somerset, the graves themselves fell between 35° and 145° (Rahtz 1978: 8).

Traditionally, most researchers account for this off-axis discrepancy by minimising it as an ‘acceptable’ error allowance. For example, Scott (2011) uses the ‘uniformity’ of burial as evidence of the Christian belief of the early mediaeval Irish. However, she does not give hard data for burial alignment and it is, therefore, difficult to know if the east-west alignment is a *true* east-west, and if all but the 11 to be discussed presently are *consistently* in the same alignment. She does mention that 11 graves (3.6%) are in a different alignment—one each with head at southwest, northwest, and northeast; and seven burials which were aligned north-south (Scott 2011: 62). While making mention of these burials, she offers no explanation for the alignment variation.

Ali and Cunich (2001) proposed that early medieval Christians were using magnetic north to plot alignment and would be ‘off-axis’ as a natural result. Most researchers who do attempt to explain the ‘off-axis’ problem have explored a connection to the movement of the sun: the position of the sunrise on the day of a particular patron saint or the calculation of that year’s Easter (Hoare and Sweet 2000, Longley 2002, Sassin Allen 2016). Landscape or structural obstacles, careless grave diggers, personal or regional beliefs, and mere randomness have also been given as possible reasons (Buckberry 2004, Maldonado-Ramírez 2013, Rahtz 1978).

In the pagan-Christian burial checklist, orientation is but one criterion for which flaws exist. The Church shows no interest in defining a burial rite. There is, overall, nothing to suggest that grave-goods *of any kind* are damnable, that interment on one’s side (stomach, seated, or even on one’s head) is immoral, nor that being placed in a boat or chamber will doom one’s soul. During the late mediaeval period, the Church *did* become involved in canonising funerary rituals; but this was not the case in the early mediaeval period.

It is not unusual for burial form to show a correlation with religion. However, whether the connection between religion and burial is causal or tangential has not been established. Testing the validity of such an assumption is necessary to fully understand the expression of identity in the past. The categorical division of pagan vs Christian in early mediaeval Scottish archaeology needs to be comprehensively tested as a valid research construct. Therefore, for the purposes of investigating this binary doxa, the commonly accepted religious designations for each site were maintained (Table 7.1). Again, the practice of classifying an entire site as one ‘religion’ or another is relatively common in the study of early mediaeval Scotland, and in light of the limited site records, this practice was maintained.

The two remaining sites, Bustatoun and Sandwick, are unclassified in the literature; however, due to the nature of the burials, they can be tentatively

Religion	Site	Sources
Pagan	Balnakeil	Batey and Paterson 2012, Low *et al* 2000.
	Cnip	Dunwell *et al* 1995, Welander *et al* 1987.
	Gurness	Graham-Campbell 2003
	Kiloran	Harrison 2000, Morris 204, Müller-Wille 2007.
	Pierowall	Graham-Campbell 2004, Sikora 2003.
	Scar	Owen 2004.
	Westness	Barrett *et al* 2000, Graham-Campbell 2003.
Christian	Birsay	Hedges 1983, Morris 1989, Ritchie 1976.
	Breckness	RCAHMS 2016.
	Bu of Cairston	Stevens *et al* 2005.
	Carlisle	McCarthy *et al* 2014a, 2014b.
	Captain's Cabin	Moloney *et al* 2001, Perry *et al* 2000.
	Iona	McCormick *et al* 1988, O'Sullivan 1994, Reece 1981.
	John o' Groats	Driscoll 1989.
	Newark	Barrett *et al* 2000, Brothwell 1977.
	St. Ninian's Kirk	Aitken 1955, RCAHMS 2016.
	St. Ninian's Isle	Barrowman 2011, 2003.
	Skaill House	James *et al* 1999, RCAHMS 2016.

Table 7.1, Research Sites and their Commonly Accepted Religious Designations.

placed into the pagan category: Bustatoun due to the 'Viking' artefacts discovered in association with the graves (RCAHMS 2016); and Sandwick due to the skeletal alignment, the prone burial, and the radiocarbon results showing a date earlier than the accepted date of Christian conversion (Bigelow 1984). There is not enough information to classify the Grutness site one way or the other. Therefore, Grutness has been eliminated from this particular evaluation.

7.2.1 Testing Classification by Religion

In order to test the validity of the pagan-Christian mortuary doxa, each site was evaluated for general body positions, grave enclosures, grave goods, and associated structures. The checklists above (Section 7.2) are used in keeping with the generally accepted meanings. Attribute designations are given as: Christian, pagan, or ambiguous. For example, using the doxa, a supine and extended body is seen as ‘Christian’. A crouched body (on one side with legs and arms bent) is seen as ‘pagan’. However, a supine individual with legs bent could be either ‘pagan’ or ‘Christian’ and would be designated ‘ambiguous’.

Each site listed above as pagan or Christian is examined below. The basic criteria used to determine the religious classification of a site is laid out in a table. The specific factors for that site are then determined to be Christian, pagan or ambiguous in nature. Using the criteria set out by the doxa itself, these determinations are used to assess the accuracy of the accepted designations for each site. This will clarification whether the ‘pagan’ or ‘Christian’ designation has been used with reasonable consistency.

7.2.1.1 Balnakeil

<u>Generally Accepted Designation</u>: Pagan

The Balnakeil burial site is often considered a paradigm of pagan, ‘Viking’ (Norse) grave form (Low *et al* 2000). Indeed, the inclusion and type of grave goods, in addition to the position of the body, does suggest a pagan classification (Table 7.2).

Criteria	Description	Designation
Body Position	Flexed on Right Side	Pagan
Grave Enclosure	None, Earthen	Ambiguous
Grave Goods	Weapons, Gaming Pieces, Needle Case, Belt Fittings, Comb, Beads, Fishing Equipment	Pagan
Structures	None Known	Ambiguous

Table 7.2, Criteria and Designation Results for the Balnakeil Burial.
Grave Information from Batey and Paterson 2012, Low *et al* 2000.

Two of the criteria are ambiguous in nature: there is no known grave enclosure nor are there any known structures. This is consistent with many forms of religious burial and are therefore not indicative of either a Christian or a pagan categorisation. Although the enclosure and structure evidence is ambiguous, it is within the doxa of 'pagan' burial. The balance of evidence is, therefore, on the side of the 'pagan' label being accurate.

<u>Balnakeil Post-Examination Classification</u>: Pagan

7.2.1.2 Cnip

<u>Accepted Designation</u>: Pagan

The Cnip cemetery is traditionally considered pagan[1]. However, when broken down by the simplistic criteria divisions, this designation is far from clear (Table 7.3). Christian body alignment of east-west (or 'off' east-west) is present in five of the seven burials: A, C, and E-G. Christian body positioning—supine and generally extended, with flexed legs being an acceptable variant—is also present in five of seven of the burials: A and C-F. The graves have grave enclosures which are not diagnostically pagan or Christian: all are earthen; some with stone surface markers. Four of the burials do include grave goods, which could indicate a pagan nature to the graves[2]. However, Individual A is the only interment which truly has potential to be considered 'pagan' by the amount and particularly the type of grave goods; particularly for the knife, whetstone, sickle, and needle case.

Individual E's grave goods were a bone pin and an iron plate (Dunwell *et al* 1995), and while it is unclear for what these items were used, there is nothing which would suggest a 'non-Christian' nature to these objects.

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1 The accepted classification of Cnip as a pagan, viking cemetery is so ingrained, that the only suggestion given for the identity of the individuals without viking style grave goods is that they may have been slaves (see Montgomery *et al* 2003; although, this suggestion is tempered a bit in Montgomery and Evans 2006).

2 Individual G is listed with an iron nail; however, there is not enough information to determine whether this is intentional deposit, or accidental spoil.

Ind	Criteria	Description	Designation
A[2]	Body Position	Supine, Extended	Christian
		SW-NE	
	Grave Enclosure	None, Earthen	Ambiguous
	Grave Goods	Whetstone, Bronze Pin, Needle Case, Knife, Sickle, Belt Pieces, Comb, Beads, Oval Brooches	Pagan
	Structures	No	Ambiguous
B[1]	Body Position	Crouched, On Left Side	Pagan
		S-N Alignment	Pagan
	Grave Enclosure	None, Earthen	Ambiguous
		Stone Surface Marker	Ambiguous
	Grave Goods	Amber Bead, Stone Pendant, 3 Iron Nails	Pagan
	Structures	No	Ambiguous
C[1]	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
		Stone Surface Marker	Ambiguous
	Grave Goods	None	Christian
	Structures	None	Ambiguous
D[1]	Body Position	Supine, Extended	Ambiguous
		N-S Alignment	Pagan
	Grave Enclosure	Earthen	Ambiguous
		Stone Surface Marker	Ambiguous
	Grave Goods	None	Christian
	Structures	No	Ambiguous
E[1]	Body Position	Supine, Flexed	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
		Stone Surface Marker	Ambiguous
	Grave Goods	Iron Plate, Bone Pin	Pagan
	Structures	None	Ambiguous
F[1]	Body Position	Supine, Extended NW-SE	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	Bead	Pagan
	Structures	None	Ambiguous
G[1]	Body Position	Legs Flexed, On Right Side	Pagan
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	Iron Nail	Ambiguous
	Structures	No	Ambiguous

Table 7.3, Criteria and Designation Results for the Cnip Cemetery.
([1]Dunwell *et al* 1995, [2]Welander *et al* 1987).

Individual B was buried with an amber bead, a stone pendant, and three nails and Individual F was deposited with a bead. Again, there is nothing to suggest an inherent ‘pagan’ or ‘non-Christian’ nature to these objects. In fact, as B and F were young children, there is some correlation with the child burials at the Christian site of St. Ninian’s Isle (Section 7.2.1.17).

Overall, the analysis suggests an ambiguous nature for the Cnip cemetery.

Cnip Post-Examination Classification: Ambiguous

7.2.1.3 Gurness

Accepted Designation: Pagan

The burial at Gurness is generally considered pagan (Graham-Campbell 2003). Table 7.4, however, shows that this classification is less than absolute.

Criteria	Description	Designation
Body Position	Supine, Extended	Christian
	E-W Alignment	Christian
Grave Enclosure	Cist	Ambiguous
Grave Goods	Oval Brooches, Necklet, Sickle, Knife	Pagan
Structures	Inserted in Broch Wall	Pagan

Table 7.4, Criteria and Designation Results for the Gurness Burial.
Grave Information Taken from Robertson 1969.

Firstly, the positioning of the individual in the grave is in the ‘classic’ *Christian* style: supine, in an east-west alignment. In addition, the grave does have goods; however, they are comparatively meagre (Balnakeil, Scar or Kiloran for example). In fact, what is included in the grave are oval brooches and connecting beads—essentially clothing fasteners—as well as a sickle and a knife. While these items are a part of the ‘classic’ pagan, Norse, female mortuary suite, such things are not *only* found in Norse, ‘pagan’ burials

(Thompson 2004: 51-5). Reuse of sites, particularly when a grave is inserted into a structure is often considered a ‘pagan’ attribute (Leonard 2011: 47-50, Tarlow 1997, Williams 1997). However, on balance the criteria propose a label of ambiguous, with the potential to be pagan.

Gurness Post-Examination Classification: Ambiguous

7.2.1.4 Kiloran

Accepted Designation: Pagan

Like Balnakeil, Kiloran is a grave site which is commonly used as an archaeotype of a pagan, ‘Viking’ style grave. Except for the east-west alignment, the information in Table 7.5 supports this assumption. What is not mentioned in Table 7.5, and yet must be addressed, is the presence of the two stone slabs with cross figures etched into their surface.

Criteria	Description	Designation
Body Position	Crouched on Left Side	Pagan
	E-W Alignment	Christian
Grave Enclosure	Chamber/Large Cist. Possible Boat.	Pagan
Grave Goods	Scales with Weights, Weapons, Horse Equipment, Horse, Coins	Pagan
Structures	None	Ambiguous

Table 7.5, Criteria and Designation Results for the Kiloran Burial.
Grave Information Taken from Anderson 1907, McNeill and Galloway 1883.

Crawford (1987: 162) states that ‘(t)he richly furnished grave...has a feature suggesting clear Christian influence....(I)t is quite evident that the individual, or his family or following, had been influenced by Christian beliefs.’ She goes on to add that ‘This is a most important piece of evidence for a very early stage in the conversion process’. This has been the prevailing hypothesis for the cross slab inclusion (see Graham-Campbell and Batey 1998: 118-22).

However, it must be remembered that it was not uncommon for certain items to be appropriated and 'reused'. In particular, Müller-Wille (2007) suggests that the Kiloran crosses were probably taken from a nearby Christian cemetery. In addition, the Kiloran cist (or chamber) had been disturbed by rabbit burrowing and the antiquarian excavators 'reconstructed' the grave prior to reporting on it or making any drawings (McNeill and Galloway 1883). Therefore, it is not possible to know in what position these stones were placed, nor their original relationship to the grave.

Furthermore, Christianity is not the only group which utilises a cross. Particularly relevant here are the Norse runes *nauðir* and *geirr* (Gordon 1981). Both symbols were used as parts of the Norse alphabet, *fuðark*, and also as individual emblems of meaning. *Nauðir* ᚾ means 'need' or 'hardship' and *geirr* ᚷ means 'spear'. Even if the Kiloran crosses were not carved by those performing the interment and were 'stolen' from a nearby graveyard, it is entirely possible that the meaning behind the inclusion of these crosses had no connection to Christianity for those involved in the burial.

<u>Kiloran Post-Examination Classification</u>: Pagan

7.2.1.5 Pierowall

<u>Accepted Designation</u>: Pagan

The records for the Pierowall cemetery are incomplete. However, the available details do provide considerable information towards determining the validity of the accepted 'pagan' classification (Table 7.6, Thorsteinsson 1968). While there are a few criteria which do lend to a Christian designation (Grave 9 and 13: no grave goods, Grave 1 and 7: body position and alignment), these are the only instances of a Christian determination. The remaining classifications are divided between pagan and ambiguous; the majority of the designations being pagan. Therefore, it seems reasonable to conclude, with caution, that the classification of Pierowall as 'pagan' is accurate.

Ind	Criteria	Description	Designation
1	Body Position	Supine, Flexed	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen with Possible Headstone	Ambiguous
		In Mound	Pagan
	Grave Goods	Knife, Comb, Shield, Sword	Pagan
	Structures	Unknown	Ambiguous
2	Body Position	Prone?	Pagan
		S-N Alignment	Pagan
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Oval Brooches, Weaving Batten?, Ring-Head Pin	Pagan
	Structures	Unknown	Ambiguous
3	Body Position	Supine, Crouched	Pagan
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Sickle?, Comb, Oval Brooches, Bead?, Ring-Head Pin, Bone Cylinder with Internal Iron Rod	Pagan
	Structures	Unknown	Ambiguous
4	Body Position	Crouched?	Pagan
		S-N Alignment	Pagan
	Grave Enclosure	Cist?	Ambiguous
	Grave Goods	Combs, Oval Brooches, Beads, Pin, Ring Brooch?	Pagan
	Structures	Unknown	Ambiguous
6	Body Position	On Right Side	Pagan
		S-N Alignment	Pagan
	Grave Enclosure	Possible Boat?	Pagan
	Grave Goods	Axe, Shield	Pagan
	Structures	Unknown	Ambiguous
7	Body Position	Supine, Extended	Christian
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Horse, Bridle Bit, Dog, Spear?	Pagan
	Structures	Unknown	Ambiguous
8	Body Position	Unknown	Ambiguous
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Horse, Bridle, Knife	Pagan
	Structures	Unknown	Ambiguous

Table 7.6, Criteria and Designation Results for the Pierowall Cemetery.
Grave Information Taken from Thorsteinsson 1968.

Ind	Criteria	Description	Designation
9	Body Position	Flexed on Right Side	Pagan
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
10	Body Position	Flexed, On Right Side	Pagan
		S-N Alignment	Pagan
	Grave Enclosure	Possible Chamber	Pagan
	Grave Goods	Shield, Sword, Whetstone, Comb, Beads	Pagan
	Structures	Mound	Pagan
11	Body Position	S-N Alignment	Pagan
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Oval Brooches, Round Ornament, Pin	Pagan
	Structures	Mound	Pagan
12	Body Position	S-N Alignment	Pagan
	Grave Enclosure	Cist?	Ambiguous
	Grave Goods	Oval Brooches, Ring-Head Pin, 2 Combs in Cases	Pagan
	Structures	Mound	Pagan
13	Body Position	S-N Alignment	Pagan
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	None	Christian
	Structures	Mound	Pagan
14	Body Position	S-N Alignment	Pagan
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Oval Brooches, Ring-Head Pin, 2 Combs	Pagan
	Structures	Mound	Pagan
15	Body Position	Unknown	Ambiguous
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Axe, Shield, Spear	Pagan
	Structures	Unknown	Ambiguous
16	Body Position	Unknown	Ambiguous
	Grave Enclosure	Possible Boat	Pagan
	Grave Goods	Knife, Sickle, Key, Drinking Horn, Clay Bead	Pagan
	Structures	Unknown	Ambiguous
17	Body Position	Unknown	Ambiguous
	Grave Enclosure	Boat?	Pagan
	Grave Goods	Horse, Buckles, Bone Button	Pagan
	Structures	Unknown	Ambiguous

Table 7.6, Criteria and Designation Results for the Pierowall Cemetery, cont.
Grave Information Taken from Thorsteinsson 1968.

Pierowall Post-Examination Classification: Pagan

7.2.1.6 Scar

Accepted Designation: Pagan

Using the basic methodology in Table 7.7, Scar would seem to be as Christian in nature as it is pagan. The body positioning and alignments are in the Christian-style. One of the three individuals, 135, had no (known) associated grave goods; generally a Christian characteristic. However, the grave enclosure, in addition to the style and overall quantity of the grave goods, present a strong case for a pagan classification. Therefore, the conclusion of pagan is cautiously given.

Ind	Criteria	Description	Designation
133	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Boat	Pagan
	Grave Goods	Spindle Whorls, Comb, Sickle, Weaving Batten, Needle, Shears, Whalebone Plaque, Brooch	Pagan
	Structures	None	Ambiguous
134	Body Position	Supine, Flexed	Christian
		E-W Alignment	Christian
	Grave Enclosure	Boat	Pagan
	Grave Goods	Sword, Arrows, Comb, Game Pieces	Pagan
	Structures	None	Ambiguous
135	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Boat	Pagan
	Grave Goods	None?	Christian
	Structures	None	Ambiguous

Table 7.7, Criteria and Designation Results for the Scar Burial.
Grave Information Taken from Owen and Dalland 1999.

Scar Post-Examination Classification: Pagan?

7.2.1.7 Westness

Accepted Designation: Pagan

While the site of Westness is usually given credit for being both Pictish and Norse, it is the pagan/viking attribute of the cemetery which has drawn the lion’s share of the attention (RCAHMS 2016). Thus, despite the cursory acknowledgement from researchers that the cemetery is probably both pagan and Christian, in practice the cemetery is generally treated as a pagan site. This is the primary reason the Westness site has been placed in the ‘accepted as pagan’ category within this study.

When pressed, most researchers will concede the issue in labelling Westness one religious type or another, an issue which is apparent when considering Table 7.8. Even in light of this concession, it is the pagan (viking) nature of the site which has traditionally spurred research discussion, not the (presumed) Christian-native portion of the graves (Sellevold 1999).

Ind	Criteria	Description	Designation
‘63A	Body Position	Unknown[2]	Ambiguous
	Grave Enclosure	Unknown[2]	Ambiguous
	Grave Goods	Oval Brooches, Ring-Head Pin, Beads, Weaving Batten, Bowl, Wool Combs, Neonate[2]	Pagan
	Structures	Unknown[2]	Ambiguous
‘63B	Body Position	Unknown[2]	Ambiguous
	Grave Enclosure	Unknown[2]	Ambiguous
	Grave Goods	Unknown[2]	Ambiguous
	Structures	Unknown[2]	Ambiguous
1	Body Position	Unknown, Empty?[2,3]	Ambiguous
		NW-SE Alignment[3]	Pagan
	Grave Enclosure	Earthen?[3]	Ambiguous
	Grave Goods	None?[2,3]	Christian
	Structures	Unknown[2,3]	Ambiguous
2(1)	Body Position	Jumbled and On Top of 2(2)[3]	Pagan
		NW-SE Alignment?[3]	Pagan
	Grave Enclosure	Earthen?[3]	Ambiguous
	Grave Goods	Unknown[2,3]	Ambiguous
	Structures	Unknown[2,3]	Ambiguous

Table 7.8, Criteria and Designation Results for the Westness Cemetery.
[1]The Cairns Project 2015, [2]Kaland 1993, [3]Sellevold 1999.

Ind	Criteria	Description	Designation
2(2)	Body Position	Jumbled and Beneath of 2(1)[3]	Pagan
		NW-SE Alignment?[3]	Pagan
	Grave Enclosure	Earthen?[3]	Ambiguous
	Grave Goods	Unknown[2,3]	Ambiguous
	Structures	Unknown[2,3]	Ambiguous
3	Body Position	Unknown, Empty?[2,3]	Ambiguous
		NW-SE Alignment[3]	Pagan
	Grave Enclosure	Earthen?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Unknown[2]	Ambiguous
5	Body Position	Supine, Crouched[2]	Pagan
		NW-SE Alignment[3]	Pagan
	Grave Enclosure	Oval Cist[2,3]	Pagan
	Grave Goods	Sickle, Bone Comb, Brooch, Spindle Whorls[2]	Pagan
	Structures	Farmstead, Naust[3]	Pagan
6	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[2]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
7	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[2]	Ambiguous
	Grave Goods	None?[2]	Ambiguous
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
8	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[2]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
9	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[2]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
10	Body Position	Supine, Extended?[2]	Christian
		NE-SW Alignment[2,3]	Pagan
	Grave Enclosure	Cist?[2]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous

Table 7.8, Criteria and Designation Results for the Westness Cemetery, cont.
[1]The Cairns Project 2015, [2]Kaland 1993, [3]Sellevold 1999.

Ind	Criteria	Description	Designation
11	Body Position	Supine, Extended[2]	Christian
		NW-SE Alignment[3]	Pagan
	Grave Enclosure	Boat[2,3]	Pagan
	Grave Goods	Weapons, Adze, Sickle, Hone, Flints[2]	Pagan
	Structures	Farmstead, Naust[2,3]	Ambiguous
12	Body Position	Supine, Flexed[2]	Christian
		NW-SE Alignment	Pagan
	Grave Enclosure	Oval Cist[2,3]	Pagan
	Grave Goods	Shield, Sickle, Arrowhead, Ring Pin, Comb, Dice[3]	Pagan
	Structures	Farmstead, Naust[2,3]	Ambiguous
13	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[2]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
15	Body Position	Unknown	Ambiguous
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	Unknown	Ambiguous
	Structures	Unknown	Ambiguous
17	Body Position	Unknown	Ambiguous
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?	Christian
	Structures	Farmstead, Naust[2,3]	Ambiguous
18	Body Position	Unknown	Ambiguous
		NNW-SSE Alignment[3]	Pagan
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2,3]	Christian
	Structures	Unknown	Ambiguous
19	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2,3]	Christian
	Structures	Unknown	Ambiguous
20	Body Position	Supine, Extended?[2]	Christian
		NW-SE Alignment[3]	Pagan
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2,3]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous

Table 7.8, Criteria and Designation Results for the Westness Cemetery, cont.
[1]The Cairns Project 2015, [2]Kaland 1993, [3]Sellevold 1999.

Ind	Criteria	Description	Designation
21	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2,3]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
22	Body Position	Unknown, Empty?[2,3]	Ambiguous
		ESE-WNW Alignment[3]	Pagan
	Grave Enclosure	Earthen?[3]	Ambiguous
	Grave Goods	None?	Christian
	Structures	Unknown	Ambiguous
23	Body Position	Unknown, Empty?[2,3]	Ambiguous
		N-S Alignment[3]	Pagan
	Grave Enclosure	Earthen?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
24	Body Position	Supine, Extended?[2,3]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
25	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist[2]	Ambiguous
	Grave Goods	None[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
26	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
27	Body Position	Unknown, Empty?[2,3]	Ambiguous
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
28	Body Position	Unknown	Ambiguous
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous

Table 7.8, Criteria and Designation Results for the Westness Cemetery, cont.
[1]The Cairns Project 2015, [2]Kaland 1993, [3]Sellevold 1999.

Ind	Criteria	Description	Designation
29	Body Position	Unknown, Empty?[2,3]	Ambiguous
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
30	Body Position	Supine, Extended?[2]	Christian
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
31	Body Position	Empty[2]	Ambiguous
		NW-SE Alignment[3]	Pagan
	Grave Enclosure	Boat Shaped Cist[2,3]	Pagan
	Grave Goods	None[2]	Christian
	Structures	Farmstead, Naust[2,3]	Ambiguous
32	Body Position	Unknown	Ambiguous
		ESE-WNW Alignment[3]	Christian
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Broch, Iron Age Houses?[1]	Ambiguous
33	Body Position	Unknown, Empty?[2,3]	Ambiguous
		N-S Alignment[3]	Pagan
	Grave Enclosure	Circular, Earthen[3]	Pagan
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
34	Body Position	Supine, Extended[2]	Christian
		NNW-SSE Alignment[3]	Pagan
	Grave Enclosure	Boat[2,3]	Pagan
	Grave Goods	Weapons, Comb, Fishing Weight[2]	Pagan
	Structures	Farmstead, Naust[2,3]	Ambiguous
35	Body Position	Unknown, Empty?[2,3]	Ambiguous
		Unknown Alignment	Ambiguous
	Grave Enclosure	Circular, Earthen[3]	Pagan
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
36	Body Position	Unknown	Ambiguous
		Unknown Alignment	Ambiguous
	Grave Enclosure	Irregular Earthen?[3]	Pagan
	Grave Goods	None?[2,3]	Christian
	Structures	Farmstead, Naust[2,3]	Ambiguous

Table 7.8, Criteria and Designation Results for the Westness Cemetery, Cont.
[1]The Cairns Project 2015, [2]Kaland 1993, [3]Sellevold 1999.

Ind	Criteria	Description	Designation
37	Body Position	Unknown, Empty?[2,3]	Ambiguous
		NW-SE Alignment?[3]	Pagan
	Grave Enclosure	Cist?[3]	Ambiguous
	Grave Goods	None?[2]	Christian
	Structures	Unknown	Ambiguous
Naust	Body Position	Unknown	Ambiguous
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Unknown	Ambiguous
	Structures	Unknown	Ambiguous

Table 7.8, Criteria and Designation Results for the Westness Cemetery, Cont.
[1]The Cairns Project 2015, [2]Kaland 1993, [3]Sellevold 1999.

Unfortunately, the site has never been published properly and many criteria can only be given an ambiguous designation due to lack of information. If one discounts the ambiguous categorisations, Westness tends more towards ‘Christian’ than ‘pagan’. Therefore, it must be determined that the Westness site is ambiguous, with a potential to be Christian.

Westness Post-Examination Classification: Ambiguous (Possible Christian)

7.2.1.8 Birsay

Accepted Designation: Christian

As it currently sits, the Christian nature of Birsay is purportedly connected by the monastic settlement on the Brough and the supposed Norse Christian enclave of Saevar Howe (Morris 1989). In theory, the bay had a long-term relationship with Christianity, from its mediaeval acceptance through today and the continued use of St. Magnus Church (Birsay Heritage Trust 2012). However, attaching a religion to Birsay Bay is a difficult proposition with the level of documentation available to this research (Table 7.9).

Burials such as BY 76 AN, which has a NNW-SSE alignment, or Buckquoy 1, which is more pagan in nature than Christian, make a definitive

Ind	Criteria	Description	Designation
Birsay Bay Area 1, SK1 (BY 78 CU)	Body Position	Supine, Extended?[1,2]	Christian
		E-W Alignment[1,2]	Christian
	Grave Enclosure	Earthen, Atop BY 76 AS[1,2]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Unknown	Ambiguous
Birsay Bay Cutting 1, SK2 (BY 76 AS)	Body Position	Supine, Extended?[1,2]	Christian
		N-S Alignment[1,2]	Pagan
	Grave Enclosure	Cist[1]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Atop Iron Age Structures?[1]	Ambiguous
Birsay Bay Area 1, SK3 (BY 76 AN)	Body Position	Supine, Extended?[1]	Christian
		NNW-SSE Alignment[1]	Pagan
	Grave Enclosure	Earthen, Under BY 76 AS[1]	Christian
	Grave Goods	None[1]	Christian
	Structures	Potentially Surrounded by Circular Structure[1]	Ambiguous
Birsay Bay Cist Grave 2 (BY 78 BJ)	Body Position	Unknown	Ambiguous
		E-W Alignment[2]	Christian
	Grave Enclosure	Earthen. Stone Slab Cover.[2]	Christian
	Grave Goods	Knife[2]	Pagan
	Structures	Unknown	Ambiguous
SK2, BY 78 DT	Body Position	Supine, Extended?[1]	Christian
		E-W Alignment[1]	Christian
	Grave Enclosure	Long Cist[1]	Ambiguous
	Grave Goods	Pieces of Metal (Possible Knife), Bone Comb[1]	Pagan
	Structures	Unknown	Ambiguous
SK3, BY 78 IO	Body Position	Supine, Extended?[2]	Christian
		NW-SE[2]	Pagan
	Grave Enclosure	Cairn[1,2]	Ambiguous
	Grave Goods	None?[1,2]	Christian
	Structures	None?[1,2]	Christian
Buckquoy 1	Body Position	Crouched on Right Side, Head on Pelvis[3]	Pagan
		S-N Alignment[3]	Pagan
	Grave Enclosure	Earthen[3]	Ambiguous
	Grave Goods	Silver Penny, Knife, Whetstone, Bone Mount, Buckle, Ring-Head Pin.[3]	Pagan
	Structures	Late Iron Age ‘Farm’[3]	Pagan

Table 7.9, Criteria and Designation Results for the Birsay Bay Burials.
Grave Information Taken from [1]Morris 1978, [2]RCAHMS 2016, [3]Ritchie 1976.

Ind	Criteria	Description	Designation
Buckquoy 2 (Cist)	Body Position	Supine, Extended[3]	Christian
		SW-NE Alignment[3]	Pagan
	Grave Enclosure	Cist[3]	Ambiguous
	Grave Goods	None[3]	Christian
	Structures	Late Iron Age 'Farm'[3]	Pagan

Table 7.9, Criteria and Designation Results for the Birsay Bay Burials, cont.
Grave Information Taken from [1]Morris 1978, [2]RCAHMS 2016, [3]Ritchie 1976.

designation as Christian conditional at best. Additionally, burial BY 76 AS is said to be atop Iron Age circular structures (Morris 1978). This burial was placed atop BY 76 AN, which is said to be contemporary with and at least partially encircled by one of those structures (Morris 1978: 10). Having a clearer picture of the relationship between the specific burials and the closely surrounding environment would better illuminate this situation.

<u>Birsay Post-Examination Classification</u>: Ambiguous (Possible Christian)

7.2.1.9 Breckness

<u>Accepted Designation</u>: Christian

The site of Breckness is considered a Christian site. There was a chapel on the land which was removed in 1929 (RCAHMS 2016). Graves, said to have been aligned east-west, have been discovered over the years, and some were located during the excavation of the Iron Age broch (Ballin Smith *et al* 2004, Ballin Smith 2002). However, no information is available as to the construction date of the cleared chapel, the location of the graves, specific grave landscape and layout, or any other information which would solidify or contradict the presumption that Breckness is a Christian site.

<u>Breckness Post-Examination Classification</u>: Ambiguous (Possible Christian)

7.2.1.10 Bu of Cairston

Accepted Designation: Christian

Local tradition advocates that a church and burial ground were once a part of the site (RCAHMS 2016, Stevens *et al* 2005). The burials discovered during excavation were supine and generally extended on an east-west alignment (Stevens *et al* 2005). A more specific accounting of the graves was not available to this research. Stevens *et al* (2005) reports that there were no associated grave goods or surface markers. No trace of a church was discovered during the excavation; however, only a portion of the site was excavated. In Orkney, ‘bu’ sites do tend to have churches in connection to the homestead. Thus, this tends to support the concept that Cairston is a Christian site.

Bu of Cairston Post-Examination Classification: Christian

7.2.1.11 Captain’s Cabin

Accepted Designation: Christian

The site of Captain’s Cabin, Castle Park is commonly considered Christian (Moloney *et al* 2001, Perry *et al* 2000). An individual accounting for each grave was not available to this research. Graves were primarily earthen, with instances of ‘pillow-stones’ and cist enclosures. There were generally no grave goods; only a bone and copper alloy buckle and several pins which were interpreted as shroud fasteners (Moloney *et al* 2001). This does suggest a Christian style cemetery. However, the burial alignment was primarily south-southwest–north-northeast, and no trace of a church has yet been discovered. This suggests that a classification as Christian should be given with caution.

Captain’s Cabin Post-Examination Classification: Christian?

7.2.1.12 Carlisle

Accepted Designation: Christian

The Carlisle Cathedral site has a long history of Christian activity (McCarthy *et al* 2014a, 2014b, Summerson 2004). A specific accounting for each grave was not available to this research. The burials were mainly aligned east-west; however, some had a northeast-southwest and a south-southwest–north-northeast alignment with many graves inter-cutting one another (McCarthy *et al* 2014a). A few of the burials seemed to have had their skulls placed over their torsi (McCarthy *et al* 2014a: 196). With the exception of Individual 54, buried with an antler comb, pendant whetstone, knife, strap-end, and a silver loop (McCarthy *et al* 2014a, 2014b), the additional extant grave goods were those which would have been used as clothing accessories.

The historical association of Carlisle with Christianity, along with the general nature of the graves, supports the labelling of Carlisle as Christian. However, the graves which held disarticulated skulls, the clothing fittings, and the grave goods of individual 54, are suggestive of a more complex situation. As only a portion of the site has been excavated and a more complete exploration of the site might shed further light on situation at Carlisle.

Carlisle Post-Examination Classification: Christian

7.2.1.13 Iona

Accepted Designation: Christian

Like many sites in this study, Iona has a long history as a Christian enclave. Tradition states that Iona was established by St. Columba in 563 (Adamnan 1998). O’Sullivan (1994) reports that the early mediaeval graves from St. Ronan’s were earthen and aligned southeast-northwest with no grave goods. The situation reported by Reece (1981) at Martyr's Bay suggests a much more complicated situation; however, a more detailed accounting of the individual graves was not undertaken. Thus, untangling this complexity will not be possible. Pending further investigations into the site, the balance of evidence suggests that classifying Iona as Christian is reasonable.

Iona Post-Examination Classification: Christian

7.2.1.14 John o' Groats

Accepted Designation: Christian

A large portion of the bones from the John o' Groats site were in a disarticulated mass (O'Driscoll 1989). However, it was concluded '(t)he head to the west orientation of the four intact early burials would seem to indicate that this was a Christian cemetery' (O'Driscoll 1989: 35). In light of a lack of grave goods, this is a credible determination.

However, a total of 59 individuals were analysed for this research, most of which were fragmented and commingled: not the expected grave environment in a Christian cemetery. In addition, '(t)he orientation of the late skeletons with their heads to the east is the opposite of a conventional Christian burial rite, although why this should be the case is unclear. What can be noted is that sequential burial in the same grave argues against the orientation being the result of haphazard or casual interment' (O'Driscoll 1989: 35).

Again, no detailed map of the excavation was available to this study. No structures (such as a chapel) are known by archaeology or by local lore in the area. However, only a small portion of the site has been excavated; and it seems clear that there is, as yet, not enough information to make a determination of religious style at this time.

John o' Groats Post-Examination Classification: Ambiguous

7.2.1.15 Newark

Accepted Designation: Christian

Newark has been poorly published and excavation has occurred in only a small portion of the site. The graves at Newark Bay are reported to have been in an east-west alignment (RCAHMS 2016). Brothwell reports to have located the church associated with the site (RCAHMS 2016), while Lowe (2000) calls this ‘putative’. The majority of the burials located by Lowe (2000) were in a northwest-southeast alignment. Ten of the burials in the Lowe excavation were supine and extended, and one burial was prone (Lowe 2000).

The majority of the graves in the Brothwell excavation are reported to have no grave goods (RCAHMS 2016). One ‘Viking’ grave was purportedly discovered; however, no additional information was given about this burial.

In consideration of the limited information available, a determination of Newark as ‘Christian’ is far from definitive.

Newark Post-Examination Classification: Ambiguous

7.2.1.16 St. Ninian’s Point, Bute

Accepted Designation: Christian

St. Ninian’s Bute is deemed a Christian site based on chapel ruins (Aitken 1955). It is presumed by Aitken that burials L, I and C were ‘pagan’ due to orientation and that they pre-date the chapel and the ‘Christian’ burials (Table 7.10). Burial I was beneath and therefore stratigraphically earlier than H; however, dating of the site was only cursorily attempted. Therefore, it is possible that all the burials are relatively contemporary with one another. It is also possible that burials L, I and C are contemporary with the chapel, and the other burials fall outside the time frame of ‘Christian’ use. Thus the conclusion of ‘Christian’ for the site must be given tentatively.

<u>St. Ninian’s Kirk, Bute Post-Examination Classification</u>: Christian?

Ind	Criteria	Description	Designation
A	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	Bronze Strip	Ambiguous
	Structures	Inside Church, Near Altar	Christian
B	Body Position	Supine, Extended?	Christian
		WNW-ESE Alignment	Pagan
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
C	Body Position	Supine, Extended?	Christian
		SW-NE Alignment	Pagan
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
D	Body Position	Supine, Extended?	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
E	Body Position	Supine, Extended?	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
F	Body Position	Supine, Extended?	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
G	Body Position	Supine, Extended?	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian

Table 7.10, Criteria and Designation Results for the St. Ninian’s Chapel, Bute Burials. Information Taken from Aitken 1955.

Ind	Criteria	Description	Designation
H	Body Position	Supine, Extended?	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
I	Body Position	Supine, Extended?	Christian
		N-S Alignment	Pagan
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
J	Body Position	Supine, Extended?	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen, Pillow Stones	Ambiguous
	Grave Goods	None	Christian
	Structures	Church	Christian
K	Body Position	Supine, Extended?	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen, Pillow Stones	Ambiguous
	Grave Goods	None	Christian
	Structures	Immediately Next to Church	Christian
L	Body Position	Supine, Extended?	Christian
		N-S Alignment	Pagan
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	Jet Armlet	Pagan
	Structures	Church	Christian

Table 7.10, Criteria and Designation Results for the St. Ninian's Chapel, Bute Burials, cont. Information Taken from Aitken 1955.

7.2.1.17 St. Ninian's Isle, Shetland

Accepted Designation: Christian

Like St. Ninian's, Bute, the Christian nature of St. Ninian's Isle comes primarily from the site name, the presence of a chapel, and the foundation legend. However, graves such as that of 'Rosemary', raise questions about the steadfast nature of this determination (Table 7.11). 'Rosemary' was originally considered a probable Bronze Age, pre-Christian, burial, because of 'her' orientation, crouched body position, and grave enclosure in the form of a short cist (Barrowman 2011, University of Aberdeen 2003c).

The recent archaeological investigations suggest that the earliest use of the site began in the 7th century, several centuries after Ninian's death (Barrowman 2011). In fact, the interpretation by the excavators is that the site was a pagan ritual centre until possibly the 9th century. The extant chapel was not built until the 11th or 12th century. On the whole, however, the preponderance of evidence currently available does lean towards a Christian designation.

St. Ninian's Isle Post-Examination Classification: Christian?

Ind	Criteria	Description	Designation
Hubert	Body Position	Supine, Extended[3]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Cist[2,3]	Ambiguous
	Grave Goods	None[2,3]	Christian
	Structures	Chapel[1,2]	Christian
Robert	Body Position	Supine, Extended[2,4]	Christian
		Alignment Unclear	Ambiguous
	Grave Enclosure	Coffin Surrounded by Cist[2,4]	Ambiguous
	Grave Goods	None[2,4]	Christian
	Structures	Chapel[1,2]	Christian
Rosemary	Body Position	Prone on Left Side, Legs Flexed[1,2,5]	Pagan
		N-S Alignment[1,2]	Pagan
	Grave Enclosure	Cist Inserted in a Wall[1,2,5]	Pagan
	Grave Goods	None[1,2,5]	Christian
	Structures	Chapel[1,2]	Christian
1	Body Position	Unknown	Ambiguous
		Unknown	Ambiguous
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Unknown	Ambiguous
	Structures	Chapel	Christian
2	Body Position	Unknown	Ambiguous
		Unknown	Ambiguous
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Unknown	Ambiguous
	Structures	Chapel	Christian

Table 7.11, Criteria and Designation Results for the St. Ninian's Isle Burials.
Information from Barrowman [2]2011, [1]2003, University of Aberdeen [3]2003a, [4]2003b, [5]2003c.

Ind	Criteria	Description	Designation
3	Body Position	Unknown	Ambiguous
		Unknown	Ambiguous
	Grave Enclosure	Unknown	Ambiguous
	Grave Goods	Unknown	Ambiguous
	Structures	Chapel	Christian
5	Body Position	Disarticulated[1,2]	Pagan
		E-W Alignment[1,2]	Christian
	Grave Enclosure	Cist[1,2]	Ambiguous
	Grave Goods	Knife[1,2]	Pagan
	Structures	Chapel[1,2]	Christian
6	Body Position	Supine, Flexed[1]	Christian
		N-S Alignment[1,2]	Pagan
	Grave Enclosure	Earthen, Possible Cist[1,2]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Chapel[1,2]	Christian
7	Body Position	Supine, Extended[2]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Earthen, Possible Cist[1,2]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Chapel[1,2]	Christian
8	Body Position	Supine[1,2]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Cist, Cairn[1,2]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Chapel[1,2]	Christian
9	Body Position	Supine, Flexed[1,2]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Cist, Cairn[1,2]	Ambiguous
	Grave Goods	Limpet Shell in Mouth[1]	Pagan
	Structures	Chapel[1,2]	Christian
10	Body Position	Supine, Extended[1,2]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Cist, Cairn[1,2]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Chapel[1,2]	Christian
11	Body Position	Supine, Extended[1,2]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Cist, Cairn[1,2]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Chapel[1,2]	Christian

Table 7.11, Criteria and Designation Results for the St. Ninian's Isle Burials, cont.
Information from Barrowman [2]2011, [1]2003, University of Aberdeen [3]2003a, [4]2003b, [5]2003c

Ind	Criteria	Description	Designation
12	Body Position	Supine[1,2]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Cist, Cairn[1,2]	Ambiguous
	Grave Goods	None[1]	Christian
	Structures	Chapel[1,2]	Christian
13	Body Position	Supine, Flexed[1,2]	Christian
		NW-SE Alignment[2]	Christian
	Grave Enclosure	Cist, Cairn[1,2]	Ambiguous
	Grave Goods	Quartz Pebble in Mouth[1]	Pagan
	Structures	Chapel[1,2]	Christian

Table 7.11, Criteria and Designation Results for the St. Ninian's Isle Burials, cont.
Information from Barrowman [2]2011, [1]2003, University of Aberdeen [3]2003a, [4]2003b, [5]2003c

7.2.1.18 Skaill House

Accepted Designation: Christian

Although no church is known in association with Skaill House, from a preliminary standpoint, the Skaill House site is Christian in nature (Table 7.12). Caution should be taken, however, considering that the cemetery has only been explored to a small extent.

Skaill House Post-Examination Classification: Christian

Ind	Criteria	Description	Designation
1	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	None	Ambiguous
	Grave Goods	None	Christian
	Structures	None	Ambiguous
2	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	None	Ambiguous
	Grave Goods	None	Christian
	Structures	None	Ambiguous

Table 7.12, Criteria and Designation Results for the Skaill Burials. From James *et al* 1999.

Ind	Criteria	Description	Designation
3	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Unclear	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
4	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Unclear	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
5	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen with Head Box	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
6	Body Position	Supine	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen?	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
7	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Cist	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
8	Body Position	On Right Side	Pagan
		SW-NE Alignment	Ambiguous
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
9	Body Position	Unclear, Possibly Prone	Ambiguous
		E-W Alignment	Christian
	Grave Enclosure	Cist?	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
10	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous

Table 7.12, Criteria and Designation Results for the Skaill House Burials, cont.
Information from James *et al* 1999.

Ind	Criteria	Description	Designation
11	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen with Head Box	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
12	Body Position	Supine, Extended	Christian
		E-W Alignment	Christian
	Grave Enclosure	Slab Covering	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
13	Body Position	Supine, Flexed	Christian
		E-W Alignment	Christian
	Grave Enclosure	Earthen, Pillow Stones	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous
Cist	Body Position	Prone, Extended	Pagan
		E-W Alignment	Christian
	Grave Enclosure	Cist	Ambiguous
	Grave Goods	None	Christian
	Structures	Unknown	Ambiguous

Table 7.12, Criteria and Designation Results for the Skaill House Burials, cont.
Information from James *et al* 1999.

7.2.2 Burial form by Religion: Discussion

Although modern research in the early mediaeval period has questioned uncritical classification of archaeological sites into resolute categories; this is still relatively commonplace for early mediaeval Scotland, where burial sites continue to be uncritically classified as ‘Christian’ or ‘pagan’.

One aim of this research was to test the validity of this doxa. The commonly accepted religious classifications for the research sites were assessed using the commonly accepted grave form indicators of those classifications. Using the doxa for religious burial form, the ‘indicators’ of religion and the religious classifications should match, validating the usage of this system. While many of the sites above did, overall, maintain their religious classifications after a comparison to the criteria (St. Ninian’s Isle and

Pierowall, for instance), some of the sites did not; such as: Cnip, Westness and Newark.

The manifest problem with the testing method was that complete records were unavailable for many of the sites in question. This made some categorical determinations imprecise. In addition, some of the criteria commonly used to determine the religious nature of a burial or cemetery site are, in reality, ambiguous at best (Chapter 3). Christian grave orientation, for example, *tends* to be east-west, extended and supine. In opposition, pagan graves are *sometimes* on an axis other than east-west and *sometimes* not extended and supine (crouched and on one side, for instance). However, there are many examples of so called Christian sites with alternative body positions and alignments; and there are many so called pagan graves which are aligned east-west and laid out supine and extended (again, see Chapter 3). It would seem, then, that burial alignment and body position may actually provide less diagnostic information than research has traditionally attributed to them.

In addition, the concept of grave goods is thoroughly problematic. Even if one were to accept the definition that a grave good is anything in the grave outside the human remains themselves; how does one assign a purpose and a meaning to any given 'good' discovered in the grave? For example, are the belt fittings discovered in many of the graves from Carlisle Cathedral the remains of special belts chosen specifically to be interred with the deceased, or were they just what ever the corpse happened to have on at the time of burial? If the former, can these belt fittings be 'assigned' a Christian label, or could these fittings have been specially chosen for some other reason?

While the above is not meant to suggest that Christian or pagan versions of burial do not exist, it would appear that such narrow, processual concepts have proved imperfect when tested in accordance with its *own criteria*.

7.3 Burial Form by Ethnicity

Within the study of early mediaeval Scotland, ethnicity continues to be discussed in the binary categories of 'native' and 'Norse' (Barrett 2003, Macniven 2013). Within the larger field(s) of study regarding the early mediaeval period, there is considerable literature critiquing the simplistic usage of the term 'ethnicity' and the (over) ease with which researchers label sites or objects (Halsall 2011, Härke 2014, Jones 1997, Lucy 2002, Maldonado Ramírez 2013). Lucy (2002, 2001), for example, has illustrated that the material culture once identifies as 'Anglian', 'Saxon', and 'Jutish' did not correspond geographically to the historically 'known' kingdoms. Her suggestion was that the 'Anglo-Saxon' ethnicities were later creations and did not exist in the early medieval period.

Processualist concepts of ethnicity are still, however, used uncritically in discussing identity in early mediaeval Scotland. For example, Barrett (2003) does admit that ethnicity is complicated and not always as easy as a specific pattern of DNA. He does, however, state that, '[T]he predominately Norwegian connections of early historic Scotland are relatively clear' (Barrett 2003: 74). He then goes on to discuss the peoples in early mediaeval Scotland as 'Scottish' and 'Norse (meaning Norwegian). He does not demonstrate how the eventual usurping of northern Scotland into the Norwegian kingdom as written in 'official' history, translates to the Norse in Scotland coming from, or seeing themselves as Norwegian at any point: from the first settler to the eventual severing of political ties to Norway (see Cowan 1984, Downham 2012, 2009, Hammond 2006 for an opposing view. Graham-Campbell (2004) in particular is a very good review of how terms such as 'Dane', 'Scandinavian', and 'Norse' were manipulated over the course of time into definitive meanings and categories).

As with religion, testing the validity of such processualist ethnotyping was an objective of this research. Table 7.13 lists the sites in this study by their commonly accepted ethnic designations. Also listed are the characteristics which have been traditionally used to denote these labels. Unfortunately, the incompleteness of the records for most of the sites in this thesis make a robust comparison impossible. As with categorisation by religion, within the study of early mediaeval Scotland, sites tend to be classified as a whole as 'native' or 'Norse'. Therefore, adhering to this pattern a reasonable way to test the doxa of ethnicity.

The following sections use the information in Table 7.13 to perform a preliminary critique of the ethnic labels given to each site. Note—as alluded to in the section on the religious nature of Westness (Section 7.2.1.7) it is primarily the Norse portion of the site which draws the research interest, and Westness was therefore treated as a Norse site in this study.

7.3.1 Ethnicity and Burial Alignment

Site	Ethnicity	Characteristics		References
Balnakeil	Norse	Location	Sutherland	Barrett and Richards 2004 Batey and Paterson 2012 Low *et al* 2000
		Date	8-10th Cen	
		Grave Goods	Gaming Pieces Weaponry	
		Grave Orientation	Align Unknown Right Side Legs Flexed	
Birsay	Norse	Location	Orkney	Hedges 1983 Morris 1989 Ritchie 1976
		Date	9th-11th Cen	
		Grave Goods	Coin, Pin	
		Grave Orientation	S-N Align Crouched	
	Native (Pictish)	Location	Orkney	
		Date	3rd-8th Cen	
		Grave Goods	None	
		Grave Orientation	SW-NE Align Supine, Ext Many Unclear	

Table 7.13, Research Sites with Generally Accepted Ethnicity and 'Diagnostic' Criteria.

Site	Ethnicity	Characteristics		References
Breckness	Norse	Location	Orkney	RCAHMS 2016
		Date	'Medieval'	
		Grave Goods	None	
		Grave Orientation	E-W Align Supine, Ext	
Bu of Cairston	Norse	Location	Orkney	Stevens *et al* 2005
		Date	11th-12th Cen	
		Grave Goods	None	
		Grave Orientation	E-W Align Supine, Ext	
Bustatoun	Norse	Location	Orkney	Grieve 1999 RCAHMS 2016
		Date	'Medieval'	
		Grave Goods	Unclear	
		Grave Orientation	Unclear	
Carlisle	Native (poss. Anglo/ Norse)	Location	Cumbria	McCarthy *et al* 2014a, 2014b
		Date	6th-17th Cen	
		Grave Goods	1 Grave w/ Knife Whetstone Belt Fittings Comb	
		Grave Orientation	E-W Align NNE-SSW Align SW-NE Align Supine, Ext	
Castle Park	Native (Scottish Anglian)	Location	East Lothian	Moloney *et al* 2001 Perry *et al* 2000
		Date	10th-13th Cen	
		Grave Goods	Pins, 1 Buckle	
		Grave Orientation	SW-NE Align N-S Align Supine, Ext	
Cnip	Norse	Location	Outer Hebrides	Dunwell *et al* 1995 Montgomery and Evans 2006 Welander *et al* 1987
		Date	8-10th Cen	
		Grave Goods	Beads Oval Brooches Sickle, Knife & Whetstone	
		Grave Orientation	N-S Align E-W Align Supine, Ext Supine, Flexed	
Grutness	Norse	Location	Shetland	RCAHMS 2016
		Date	'Medieval'	
		Grave Goods	Unknown	
		Grave Orientation	Unknown	

Table 7.13, Research Sites with Generally Accepted Ethnicity and 'Diagnostic' Criteria, cont.

Site	Ethnicity	Characteristics		References
Gurness	Norse	Location	Orkney	Robertson 1969
		Date	10th Cen	
		Grave Goods	Oval Brooches Sickle, Knife	
		Grave Orientation	E-W Align Supine Ext	
Iona	Native	Location	Inner Hebrides	McCormick *et al* 1988 O'Sullivan 1994 Reece 1981
		Date	Mid-6th-12th Cen	
		Grave Goods	None Recorded	
		Grave Orientation	E-W Alignment Supine, Extended Many Unclear	
John o' Groats	Norse	Location	Caithness	Driscoll 1989
		Date	10th-12th Cen	
		Grave Goods	None	
		Grave Orientation	Unclear Disturbed?	
Kiloran	Norse	Location	Inner Hebrides	McNeill and Galloway 1883 Müller-Wille 2007 RCAHMS 2016
		Date	9th-10th Cen	
		Grave Goods	Boat/Chamber (?) Horse, Weapons	
		Grave Orientation	E-W Align On Left Side Crouched	
Newark	Norse	Location	Orkney	Barrett *et al* 2000 Brothwell 1977 Taylor *et al* 2000
		Date	8th-13th Cen	
		Grave Goods	Pin(s?), Comb Jet Bracelet	
		Grave Orientation	E-W Align Supine, Ext Crouched 1 Prone	
Pierowall	Norse	Location	Orkney	Ager 1999 Thorsteinsson 1969
		Date	9th Cen	
		Grave Goods	Horses, Weapons Oval Brooches	
		Grave Orientation	N-S Align E-W Align Supine,Ext Crouched	
St. Ninian's Kirk	Native	Location	Inner Hebrides	Aitken 1955 RCAHMS 2016
		Date	<9th Cen?	
		Grave Goods	Jet Armlet	
		Grave Orientation	E-W Align N-S Align Supine, Ext	

Table 7.13, Research Sites with Generally Accepted Ethnicity and 'Diagnostic' Criteria, cont.

Site	Ethnicity	Characteristics		References
St. Ninian's Isle	Norse (poss Native)	Location	Shetland	Barrowman 2011, 2003 O'Dell *et al* 1959
		Date	8^{th}-12^{th} Cen	
		Grave Goods	Knife, Pebble Limpet Shell	
		Grave Orientation	E-W Align N-S Align Supine, Ext Crouched	
Sandwick	Native	Location	Shetland	Bigelow 1984
		Date	5^{th}-6^{th} Cen	
		Grave Goods	None	
		Grave Orientation	SW-NE Align Prone, Ext	
Scar	Norse	Location	Orkney	Owen and Dalland 1999
		Date	9^{th}-10^{th} Cen	
		Grave Goods	Boat, Weapons Scale, Jewellery Game Pieces Linen Smoother	
		Grave Orientation	E-W Align Supine, Ext Supine, Flexed	
Skaill House	Norse	Location	Orkney	James *et al* 1999 RCAHMS 2016
		Date	11^{th}-14^{th} Cen	
		Grave Goods	None	
		Grave Orientation	E-W Align Supine, Ext Supine, Flexed	
Westness	Native	Location	Orkney	Barrett *et al* 2000 Kalland 1993 Sellevold 1999
		Date	6^{th}-8^{th} Cen	
		Grave Goods	None	
		Grave Orientation	E-W Align 1 SW-NE Align 1-NW-SE Align Supine, Ext	
	Norse	Location	Orkney	Barrett *et al* 2000 Kalland 1993 Sellevold 1999
		Date	9^{th}-12^{th} Cen	
		Grave Goods	Boat, Jewellery Weaving Items Weaponry	
		Grave Orientation	N-S Align NW-SE Align E-W Align Supine, Ext Crouched	

Table 7.13, Research Sites with Generally Accepted Ethnicity and 'Diagnostic' Criteria, cont.

Doxa concerning early mediaeval Scotland holds that ‘native’ burial forms are generally east-west aligned (Etheridge 1993, Maldonado Ramírez 2013, 2011, Petts 2011, 2000). Alternate alignments—particularly a north-south alignment—are linked to a Norse ethnicity (Graham-Campbell and Batey 1998: 59, 113-140, Lindström 1997, Walaker Nordeide 2007). It is, however, important to note that non-east-west alignments are primarily linked to the Norse prior to their conversion to Christianity. While an exact date is unknown for this occurrence in Scotland, the date ca 1000AD is used *ad utilitatem* in Norse studies (Gray 1922, Kristinsson 2003, Morris 2004). Thus, subsequent to this conversion date, burial alignment can no longer be used as a viable separator of ethnic burial styles.

Below is a list of the sites in this study sorted by the known grave alignments which occur at those sites. This information is generally unavailable for John o’ Groats, Bustatoun, and Grutness; therefore, these sites are not included.

NS Align	**SW-NE Align**	**NW-SE Align**	**EW Align**
Birsay	Birsay	Balnakeil	Birsay
Captain’s Cabin	Captain’s Cabin	Westness	Breckness
Carlisle	Carlisle		Bu of Cairston
Cnip	Sandwick		Captain’s Cabin
Pierowall	Westness		Carlisle
St. Ninian’s Kirk			Cnip
St. Ninian’s Isle			Gurness
Westness			Iona
			Kiloran
			Newark
			Pierowall
			St. Ninian’s Kirk
			St. Ninian’s Isle
			Scar
			Skaill
			Westness

The time period of this research, ca 800–1300AD, spans the purported pre-Christian/Christian period for the Norse. Therefore, an east-west alignment occurring throughout the research sites is to be expected. If the 'conspicuously' non-east-west alignments *are* connected to the Norse and not native ethnic identity as doxa suggests, then the instances of these alignments should be found in the Norse, not native, sites. However, these 'non-Christian' alignments *are* found at 'native' sites: Captain's Cabin, Carlisle, and Sandwick. In addition, sites which are advertised as manifest examples of Norse ('pagan') graves, Scar and Kiloran for instance, are aligned solely in an east-west orientation.

7.3.2 Ethnicity and Body Position

In the processualist doxa of early mediaeval Scottish burial, 'native' bodies are placed supine and extended (Etheridge 1993, Maldonado Ramírez 2013, Tucker 2010: 221-71). Acceptable variations are flexed legs, a cant of the body onto one side, or a combination of the two. Crouched bodies are generally considered an intrusive form. Prone bodies tend, overall, to be seen as evidence of 'otherness' (Arcini 2009, Reynolds 2009: 37, Williams 2006: 79-116).

The following is a list of sites separated by the type of body position known to exist at each site in this study. This information was not available for Grutness or Bustatoun and these sites are excluded from this list. Again, should the doxa of 'native' vs 'Norse' prove correct, any crouched burials would be found on the 'Norse' sites.

Supine, Extended	**Supine, Flexed**	**Crouched**	**Prone**
Birsay	Cnip	Balnakeil	Newark
Breckness	Skaill	Newark	Sandwick
Bu of Cairston		Pierowall	
Captain's Cabin		St. Ninian's Isle	
Carlisle		Scar	
Cnip		Westness	

Supine, Extended	Supine, Flexed	Crouched	Prone
Gurness			
Iona			
John o' Groats			
Kiloran			
Newark			
Pierowall			
St. Ninian's Isle			
St. Ninian's Bute			
Scar			
Skaill			
Westness			

A supine and extended (or flexed) body is not considered *only* a 'native' characteristic. Thus the presence of this positioning at both 'native' and 'Norse' sites is not unexpected.

The two prone burials occur at Sandwick and Newark. These are difficult to discuss with any depth as both sites have little site documentation, have not been thoroughly investigated, and have not been properly published. It can only be (rather superficially) surmised that these individuals were 'different' in some manner. In light of the purview of this thesis, further investigation is not warranted at this time.

Sorting the sites by body positions, however, did make evident that the (known) crouched positions *are* found only in the 'Norse' and not the 'native' sites. As detailed information was not available for every grave, there may be crouched burials that were not included in this exercise. However, the implication of the current categorisation is that crouched burials could be an indicator of an ethnically 'Norse' burial.

7.3.3 Ethnicity and Grave Goods

Within the study of early mediaeval Scotland, grave goods are generally considered a non-native attribute (Maldonado Ramírez 2013, Neighbour and Knott 2000, Williams 2007). Therefore, the 'Coming of the Vikings' marked an ‘intrusive’, and therefore obvious (according to the doxa), burial rite into the ‘native’ archaeological record.

Below are lists of the sites in this study separated by the known types of grave goods found at each site. Norse grave goods are those discussed in Section 3.5 and generally consist of weapons, gaming pieces, scales and weights, clothing items, animals, jewellery and so forth. Other grave goods are those that do not fit the Norse typology. These are generally minimalistic (say a shell or a piece of iron of unknown use).

Norse		**Other**	**None**
Balnakeil	Kiloran	Captain’s Cabin	Breckness
Birsay	Newark	Newark	Bu of Cairston
Bustatoun	Pierowall	St. Ninian’s Isle	Grutness
Carlisle	St. Ninian’s Isle	St. Ninian’s Point	Iona
Cnip	Scar	Carlisle	John o’ Groats
Gurness	Westness	Kiloran	Sandwick
		Cnip	Skaill

Grave good inclusions are generally not considered a part of the native rite in early mediaeval Scotland (Maldonado Ramírez 2013, Etheridge 1993, Neighbour and Knott 2000, Williams 2007). It must be noted that there is no axiom which claims that lack of grave goods is *only* a ‘native’ attribute. However, under the processual doxa, graves with grave good inclusions, particularly ‘Norse’ style inclusions, should occur at the ‘Norse’ sites and not in the ‘native’.

As with body position, the doxa generally holds for the categorised lists above. Carlisle proves to be outside this assumption; however, it must be noted that only *one* grave of the 41 reported had ‘Norse-type’ goods (McCarthy *et al* 2014a, 2014b). Again, a grave by grave analysis was not possible due to lack of detailed site records. Therefore, there may exist burials with grave goods which are not properly categorised above. However, with caution, the general grave good theory behind the Norse-native separation does seem to be valid here.

7.3.4 Discussion and Case Study: Cnip

The above examinations are, admittedly, superficial in nature. Allowances have not been made for chronological variations between sites or within sites. No accounting has been made for cemetery size, minimum number of individuals, or site landscape. There has been no investigation of the age of the individuals or of their varying sexes. Therefore, the results above can only be classified as intriguing. To be more definitive, the considerations above would need to be considered, should further information become available for these sites.

Although not conclusive, these concepts can be applied to a single site, for which more detail is available. As a case study, a preliminary analyses can test the accuracy of a given ethnic label on a particular site and demonstrate the potential for further investigation.

The site of Cnip (6.5.1) is commonly considered a Norse site (Montgomery *et al* 2003). In fact, the idea that Cnip is Norse is *so* ingrained that the two options considered for this cemetery grouping is a ‘family’ cemetery, or that the relatively unfurnished graves are those of slaves (Montgomery *et al* 2003, Montgomery and Evans 2006).

One individual, A, is a female interred with common items of viking dress in addition to an antler comb, a knife, needle case and whetstone (Welander *et al* 1987). Radiocarbon dating places her death in the 8th to 10th centuries (Montgomery and Evans 2006). The assumption, therefore, is that she is a viking woman (Welander *et al* 1987), and this is the grave upon which the leant the initial ‘Norse’ designation to the site.

As stated, individual A is presumed to be a viking woman. What is especially important here is that she is presumed to be a *Norwegian* viking woman (Dunwell *et al* 1995, Montgomery *et al* 2014, 2003, Montgomery and Evans 2006, Welander *et al* 1987). However, while isotopes suggest she is not native to Scotland, Ireland or England, they also suggest that she is *not* from Norway (Montgomery *et al* 2014).

There are an additional six known graves at the site. All individuals, including individual A, are interred in simple earthen graves. Six individuals, including individual A, are supine and generally extended. Both of these features are as indicative of a native burial pattern as a Norse one (Chapter 3). Only individual G is crouched and on one side; however, this individual is a neonate, and this is not an unusual position for an interred neonate in *any* part of the North (Crawford 1999, Finlay 2013).

Excluding individual A, grave goods for the site are minimal (Dunwell *et al* 1995, Welander *et al* 1987). Individual B, a middle child, had an amber bead, a stone pendant, and three iron nails. Middle adult E had an iron plate and a bone pin. Infant F had a bead, and neonate G had an iron nail.

While grave goods are, theoretically, suggestive of Norse ethnicity, the items themselves are not characteristically Norse. In comparison, at the 11th-16th century Scottish site of St. Trolla's, Kintradwell, Sutherland (NC90NW 7), Individual 3 was buried with a handful of marine shells, limpets and periwinkle in his hands (Lelong 2003, RCAHMS 2016). Individual 14 from the same site was interred with a cow's tooth and a red pebble. At the native site of Whithorn, Wigtownshire, Galloway (NX44SW 35, 5) an infant in the 8th-9th century layers was interred with beads of amber and slate (Hill 1997: 556-7, RCAHMS 2016). This suggests that the graves at Cnip may be more native than they are Norse.

A characteristic in favour of a Norse designation are the two Cnip graves aligned north-south, graves B and D. However, at the native site of Newhall Point, Balblair, Rosshire (11th-13th century), three of the graves were aligned north-south (Reed 1995). Two further graves at the early mediaeval native site of Wyndford Farm, Lasswade, Midlothian (NT07SE 6) were also aligned north-south (Primrose 1901).

Strontium analysis for individuals D and E does suggest that these two people were incomers to the island (Montgomery *et al* 2003, Montgomery and Evans 2006). The most likely areas of origin for male D are the Inner Hebrides, Antrim, Iceland or the Faroes; those for female E are the Inner Hebrides, the west coast of Scotland, Yorkshire Wolds and the South Downs.

These results could indicate that individual D is from the Norse lands of Iceland or the Faroes. However, it is just as likely that he is from the more native locations of Antrim or the Inner Hebrides. His interment in a north-south aligned grave lends to the Norse designation. However, he is also laid out in a supine and extended position, has no grave goods, and is in a plain earthen grave. These criteria are 'classic' indicators of Christianity (according to doxa) and therefore native, not Norse in nature. Granted, if this burial is of a *Christian* Norseman the 'classic' criteria of Christian burial is ambiguous in the determination of ethnicity. However, the radiocarbon dates for individual D place him earlier than the acknowledged date of Norse Christian conversion, even if he were on the latest end of the 2σ calibrated results: 974AD (Dunwell *et al* 1995). While this does not preclude an individual who accepted Christianity prior to the 1000AD date, what is suggested by the evidence as a whole is ambiguous: just as native as it is Norse.

Strontium results for individual E suggest she is native, not to the island of Lewis *per se*, but to Britain (the geographic area of the modern nation), yet not from any of the 'Norse' areas. She was placed supine with her legs flexed, in a plain earthen grave; certainly more Christian—thus native—in character than 'classic' Norse (Dunwell *et al* 1995). Her grave goods included a perforated a bone pin and an iron plate. The pin could have been a dress or shroud pin. What the iron plate is is unclear; however, it was discovered near her neck and a pendant seems a logical assumption. It is possible the plate was covered with paint or organic material in some design. In this case, any design—including a cross—is as likely as any other. Radiocarbon dates for female E present the same issue as for individual D. 2σ calibrated results on the latest end are 985AD, making her death earlier than the Norse acceptance of Christianity at 1000AD. Again, there is no reason she could not have accepted Christianity before 1000AD; however, the balance of evidence for this individual suggest a native ethnicity and not a Norse one; possibly a mixed group of individuals.

The Cnip cemetery is generally considered Norse; however, as detailed above, there is as much evidence to suggest Cnip is as native as it is Norse. This is not to imply that Cnip could not be a ‘Norse’ family cemetery, or that the unfurnished burials are not those of slaves. This is only to indicate that the preponderance of evidence does not specifically suggest Norseness. What should be considered here is that, to achieve straightforward results, we must be careful with the premise(s) upon which our questions are predicated.

7.4 Cemetery Types

While working with the site data over the course of this research, certain basic site types seemed to emerge from the process. As previously mentioned, due to the incomplete nature of the records, a careful analysis of the site landscape and environment was not possible. However, the available data did provide an overall sense of the sites, and it seems pertinent to include these impressions in the hope that they will aid in future research. The cemetery types that follow are a general impression of the type of site as it pertains to the information available to this research.

7.4.1 Isolated Graves

Isolated graves are single funerary deposits which are unrelated to any other known cemetery complex or burial group. To clarify, isolated graves are not necessarily single individuals; they are single burial deposits that may contain more than one individual. Four of the sites in this research yielded isolated burials. Three of these sites contained only one individual: Balnakeil, Grutness, and Gurness. The remaining site, Scar, included three individuals in one grave.

It has been proposed that isolated burials may have been failed cemeteries (Ethelridge 1993: 38). It has also been suggested that these were some form of liminal or deviant burial (Reynolds 2009). Three isolated sites in this study are in the viking style (Balnakeil, Gurness, and Scar). Grutness is, unfortunately, poorly documented and cannot be given full consideration. Since the three viking sites can readily be classified as incomer graves, it could follow that, as outsiders, the individuals would be deposited away from other, presumably insider, graves. It could also follow that these are failed cemeteries or that, as non-natives, the viking graves are a specific adherence to non-native burial forms (see 3.5). It should also be noted that both Balnakeil and Scar were located on the coast and discovered by erosion of the grave itself. It is possible that other graves may have already been lost to the sea.

It must be reiterated, however, that in the very early mediaeval (circa 400-700AD) period of Scotland, isolated graves are not uncommon (Ethelridge 1993, Maldonado Ramírez 2013, 2010, Tucker 2010). In the 1993 draft of his PhD Thesis, Etheridge found 70 isolated burials across southern Scotland, from the early mediaeval period which had no indicators of a viking style. These long cists and simple earthen graves are of a form that would readily be classified as native, yet they are not found in the vicinity of any other burials. In addition, Tucker (2010) found isolated and small cluster (see

Section 7.4.2) to be the norm for inhumation deposits. Therefore, it is entirely possible that, while still showing signs of non-native influence, these isolated burials are a ‘hold-over’ from an earlier time in native Scotland.

7.4.2 Small Cluster Groups

Small cluster cemeteries are groups of two or more graves in close proximity to one another, with no discernible relation to any further graves or cemetery complexes. Four sites in this study classified as small clusters: Bustatoun, Cnip, Sandwick, and Kiloran. Cnip holds the most graves with a total of seven; all single inhumations. There is only one confirmed grave from Kiloran Bay; however, CANMORE (RCAHMS 2016) reports that two cist graves were also discovered at that location during the 17th Century (NR49NW 15). If this report is accurate, the Kiloran site included at least three graves. Additionally, the confirmed number of graves for Sandwick is two; however, CANMORE (RCAHMS 2016) also reports that other burials have eroded out of the sand over the years.

7.4.3 Church Cemeteries

Church cemeteries are those for which a church (or chapel) is associated with the cemetery and for which that church (or an earlier incarnation of) can be reasonably affirmed. These sites are: St. Ninian’s Point, Bute; St. Ninian’s Isle; Carlisle Cathedral; and Iona. It is important, here, to note the term ‘reasonably’. These sites all have strong traditional lore of having been founded by a saint in the early Christian period and a general longevity as a church site. It should be noted, however, that a full understanding of the stratigraphy and timelines of the sites has not been accomplished. The actual timing of the construction of the churches and their relation to the burials is far from categorical.

7.4.4 Grave Fields

The category of 'grave fields' is used for burial grounds with graves numbering 10 or more, which are not reasonably associated with a church or other ecclesiastical structure. The sites in this category are: Breckness, the Bu of Cairston, Captain's Cabin, John o' Groats, Pierowall, Newark Bay, Skaill House, and Westness.

As with the church sites, there is some caution to be given to this classification. For instance, churches have been suggested for the Bu of Cairston, Castle Park, and Skaill House; yet, no trace of such a structure has been located. At Breckness, a church did once stand on the site (removed in the 1920s); however, the construction date is unknown of said building and it can, therefore, not be connected to the burials (RCAHMS 2016).

For Newark, Blaeu's 1654 atlas shows a church on the site; yet no other information is available for this particular structure. Therefore, the church could easily be contemporary to the 17th century map. CANMORE (RCAHMS 2016) reports a chapel of probable 10th Century date discovered in Brothwell's (circa 1970) excavations. These excavations have never been published, nor has any further information been given on this structure. Lowe's 2000 survey of the site revealed more burials and the potential for further buildings on the site; however, his designation of the chapel is 'putative'. Thus, the connection of graves and a coexisting church cannot be established.

In addition, there is not enough information on the site of John o' Groats or Pierowall to establish any cemetery typology outside of having more burials than 10. For the site of Westness, Blaeu's (1654) map again shows a church on the site; however, there is also no further information on this structure.

7.4.5 Unknown: Birsay Bay

Unfortunately the information that was available to this research did not provide enough information to classify Birsay Bay one way or another. As a default, it would have been simple to place Birsay in the field cemetery type; however, due to the large geography afforded by the coastline—500-600 metres (Morris 1989)—it is entirely possible that the graves from Birsay are from multiple cemeteries. Therefore, Birsay was not placed in any typological category.

7.5 Conclusion

One of the main premises of this research was to test the validity of commonly held assumptions about mortuary sites in early mediaeval Scotland, specifically regarding religion and ethnicity. Processualist doxa is still very much in use within the study area. This type of compartmentalisation does not take into consideration the realities of human identity on all its many levels. Many of the complications of this logic were illustrated in the, admittedly simplified, analyses in this chapter. Burial 'indicators' of religion such as orientation or grave goods did not provide the clear identification of 'pagan' or 'Christian', such as with Cnip, Newark and Gurness. There was some indication that position of the body position and grave good inclusions could have some correlation with a 'native' or 'Norse' ethnicity; however, as a grave by grave analysis was not possible at this time, these results should be taken with caution.

In order to further test the validity of the religious and ethnic doxa, the following chapter will present the data collected from the skeletal analysis of the individuals from each site. The cemetery typology outlined in section 7.4.4 is added as a potentially significant category, to compare with religion and ethnicity. Age and sex tend to influence the condition of the body and these factors have also been included in the analysis that follows in Chapter 8.

IDENTITY IN THE DARK AGE

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CHAPTER 8

Results, the People of 'Dark Age' Scotland

8.1 Introduction

Within the study of early mediaeval Scotland, circumscribed concepts of identity, particularly religion and ethnicity, continue to be used unchecked. Mortuary forms are commonly identified as 'Christian' or 'pagan' and 'native' or 'Norse' (see Section 7.1). This determination is then often uncritically applied to the individual(s) within the mortuary form itself. One of the objectives of this research was to test the validity of such processualist doxa as it applies to mortuary sites in early mediaeval Scotland.

In Scotland, the turn of the 8th century marked the expansion of the Kingdom of the Scots and the intrusion of the 'Vikings' upon the land. Traditional theories place a very distinct boundary between what is archaeologically 'native' and what is 'Norse' (Crawford 2000, 1995, 1987, Graham-Campbell and Batey 1998). These two 'peoples' had distinct cultures and even, as doxa asserts, distinctive physical attributes, allowing the groups to maintain this 'obvious' separation.

The previous chapter used the information from the research sites to compare to the religious and ethnic criteria commonly used to classify the sites. Doxa holds that, ethnically, the 'natives' and 'Norse' had distinct material cultures; a position which was tested in the previous chapter. Doxa also suggests that there is a biological variation between these two groups, a position which this chapter will address.

In addition, while religion is not passed via DNA from one person to another, religion often does proscribe individual roles and activities, including nutrition and food sources. All such endeavours, or restrictions on such endeavours, affect the phenotype of the body (See Chapter 4). Therefore, it is often presumed that there is an observable variation in the biology of the 'Christians' and 'pagans'.

This chapter will discuss the human remains analysed for this research using the same criteria for ethnic and religious classification used in Chapter 7. Sites *traditionally* classified as 'pagan' or 'Christian'; 'native' or 'Norse' will remain as *traditionally* classified (Section 7.2 and 7.3). All individuals from the sites will be identified with this classification for the sake of further assessment of the validity of this processualist doxa.

The additional, qualitative divisions discerned by this researcher in the form of cemetery types: isolated, small cluster[1], church, and field (Section 7.4) will also be used as categories for evaluation of the human remains in the attempt to begin seeing the population outside of the 'traditional' labels. As age and sex are often important factors in the life course, these categories are a part of the analysis and will be discussed as they are relevant to the evaluation.

Many sites discussed in this thesis were only partially excavated. In some cases, only a few individuals (or parts of individuals) were lifted. Taphonomic factors and curation complications produced fragmented bones and missing skeletal features for a portion of the sample set. The result of these factors is that a robust statistical evaluation of the population was not possible. The following dialogue is the result of what could be accomplished with the materials available and the time allotted.

8.2 Age

In a normal cemetery population, the distribution of age at death should resemble a bathtub curve when plotted in graph form (Paine and Boldsen

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1 For the sake of brevity in analysis, the term 'small cluster' was commonly reduced to 'cluster' and this pattern is reflected in the following text.

2002, Wood *et al* 2002). Thus, there should be a high number of the very young and the very old. Plotting the age at death of this early mediaeval population in toto produces the semblance of a normal distribution (Fg 8.1). However, the age percentage is high on the old end of the graph and low on the young end. For instance, the ratio of neonates to mature adults is almost 1:3: (actual 1:2.93). A chi^2 test does show that this near 1:3 ratio is a statistically significant difference (p=0.001, X^2=28.959, df=1). A normal distribution would suggest a ratio closer to 1:1 for the neonates and the mature adults.

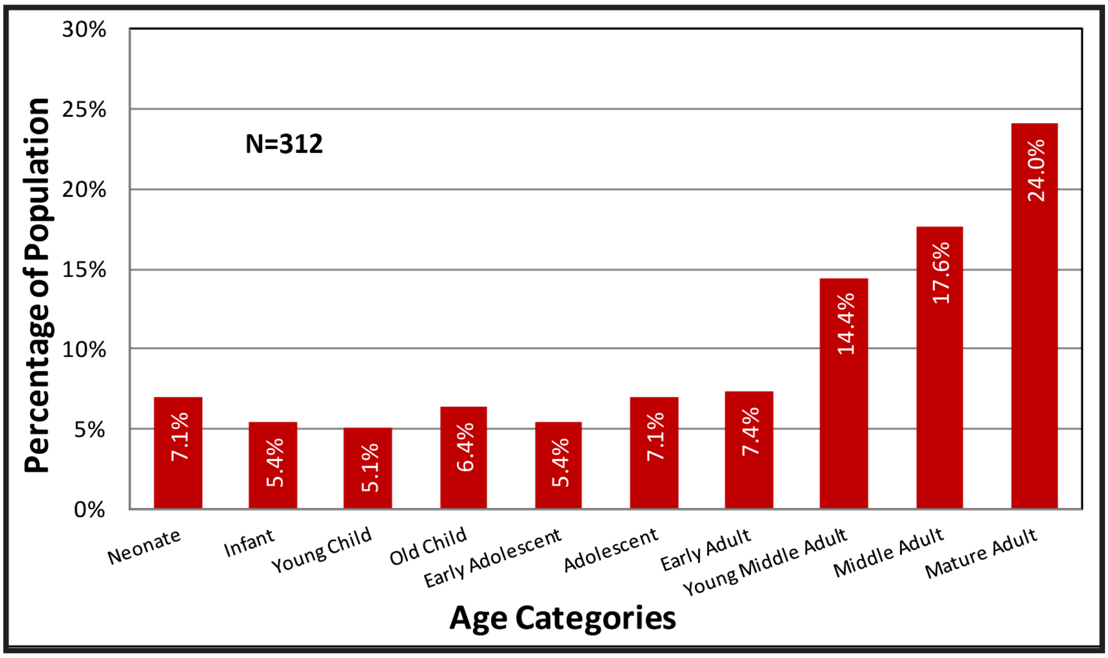

Figure 8.1, Mortality Graph for the Entire Assemblage ('Adult' Group Not Included).

The younger the individual, the more likely it is that the remains not appear (or be recognised) in a cemetery excavation (Buckberry 2000). With the not uncommon taphonomic and excavatory issues which result in the poor representation of the very young taken into consideration with the fragmented nature of this particular assemblage, it is possible that there were more deaths in the very young age groups which are simply not represented here. It is also possible that the mortality rate for the very young was not as high as is commonly thought, at least for this early mediaeval Scottish population. If so, this would indicate an unexpectedly healthy childhood for this demographic. In addition, there were a total of 100 individuals in the assemblage for whom age could only be determined as skeletal adulthood. These have been excluded from the data shown in the distribution graph. These individuals have the potential to alter the mortality curve considerably, should a more accurate age at death be established.

Additionally, it is also possible that children, once deceased, were handled in a manner other than interment in the ground, or in the ground with older age groups; and thus, this is not reflected here. Crawford (2008), for example, suggested that neonate and infant burials found on Anglo-Saxon settlement sites were placed as a special deposit, and not indifferent disposal as is often assumed. Throughout the Iron Age in Scotland, body deposition was prone to non-inhumation forms, only moving towards inhumation in the late Iron Age, 300-800AD (Tucker 2010). It is possible that the bodies of the very young were still being treated in an 'Iron Age' manner while the older cohorts were being inhumed.

Non-Christianised burial sites have been shown to have few children under age three (Crawford 1999, Wicker 2012); while Christianised cemeteries are generally known to include a comparatively high number of small children (Sparey-Green 2003, Thompson 2004). If this observation is accurate, comparing the sites by their commonly accepted religious classifications (see Section 7.2) should conform to this trend. However, the comparison of 'pagan' vs 'Christian' cemeteries shows that this simplistic classification of religion does not account for the demographic pattern.

At the Christian site of St. Ninian's Isle, for example, there are seven individuals age three or under (43.8%). However, at St. Ninian's Bute—also a Christian site—there are none (Table 8.1). This is also the case at Carlisle,

Site	Religion	< 3 yrs	% Population
Balnakeil	Pagan	0	0
Cnip	Pagan	2	28.6
Gurness	Pagan	0	0
Kiloran	Pagan	0	0
Pierowall	Pagan	0	0
Scar	Pagan	0	0
Westness	Pagan	4	13.3
Birsay	Christian	2	20.0
Breckness	Christian	1	7.7
Bu of Cairston	Christian	7	6.4
Carlisle	Christian	0	0
Castle Park	Christian	17	22.4
Iona	Christian	0	0
John o' Groats	Christian	11	18.6
Newark	Christian	5	6.8
St. Ninian's Kirk	Christian	0	0
St. Ninian's Isle	Christian	7	43.8
Skaill House	Christian	0	0

Table 8.1, Pagan and Christian Sites with Number of Children 3 and Under.
Bu of Cairston Data from Stevens *et al* 2005 [Category 4 (age 1 to 5) Not Included].

and Iona. Additionally, 28.6% of the Cnip assemblage includes children under three. This is the second highest occurrence of small children among the sites in this study; however, Cnip is commonly classified as a 'pagan' cemetery.

Admittedly, a portion of this discrepancy is likely due to taphonomy and sampling bias. The information on Carlisle, for example, only includes that which was kept from reburial (potentially biased towards adults), and not the complete cemetery population or even the complete population excavated by the archaeological team (McCarthy *et al* 2014a, 2014b). However, sites such as Cnip, Westness, and St. Ninian's, Bute were fully excavated—as far as could be determined at the time. This suggests that the reason for the appearance (or non-appearance) of children under three is not due to the level of Christian acculturation or religious affiliation of any particular site.

A chi^2 test shows that the two religious groupings are different: $p=0.03$, $\chi^2=18.1$, df=1. In fact, it is the 'pagan' data which produces more of a bathtub shape than the ‘Christian’ (Fg 8.2). This suggests that, once the danger of infancy is passed, those at the ‘pagan’ sites had a higher likelihood of reaching middle and mature adulthood than those at the ‘Christian’ sites.

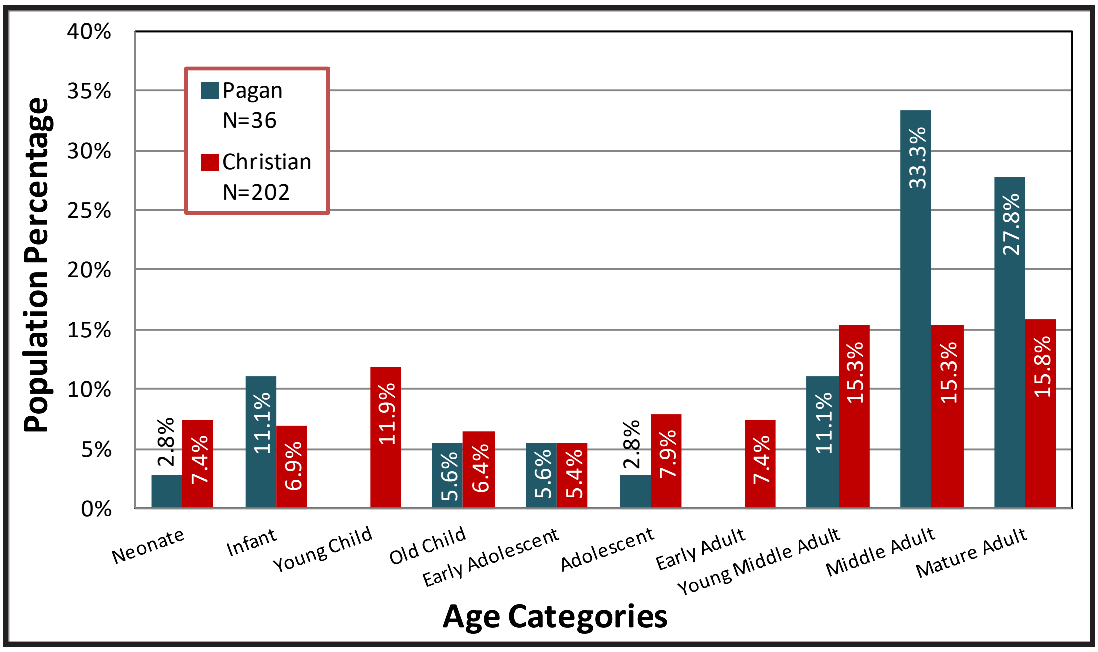

Figure 8.2, Mortality Curve for Pagan and Christian Sites (‘Adult’ Group Not Included).

‘Norse’ sites produce a mortality curve in a relatively classic bathtub shape (Fg 8.3). The ‘native’ sites; however, produce a much less concave shape. A chi^2 test shows that the two groups are different: p=0.04, χ^2=17.3, df=1. Based on this information, it appears that the ‘Norse’ group exhibited more longevity than the ‘native’.

Among site types (see Section 7.4), church and cluster groups show the most concave curve: the most deaths in the older and younger groups, while the mortality curve for the field group has a much more moderate slope (Fg 8.4).[2] A chi^2 test shows that the groups are different: p<0.001, χ^2=72.231, df=18. This suggests that, once past infancy, it is the church and cluster groups which were more likely to reach mature adulthood before death.

At this point, it is pertinent to reiterate that osteological ageing methods

2 Number of individuals for the isolated group untenable for inclusion in analysis (N=3).

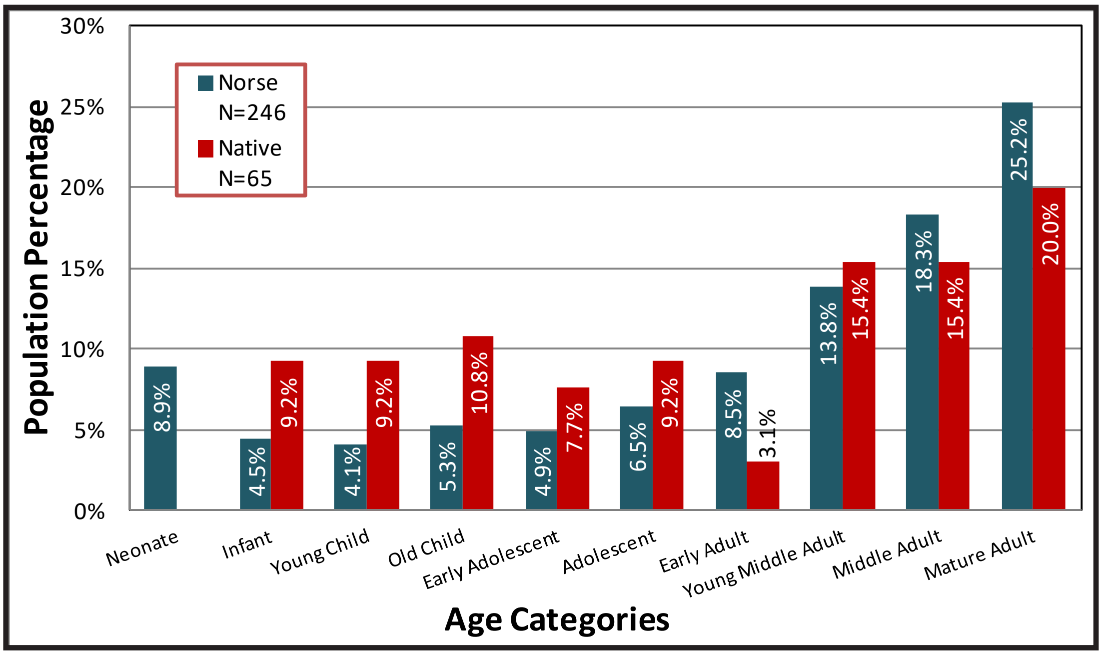

Figure 8.3, Mortality Curve for Norse and Native Sites ('Adult' Group Not Included).

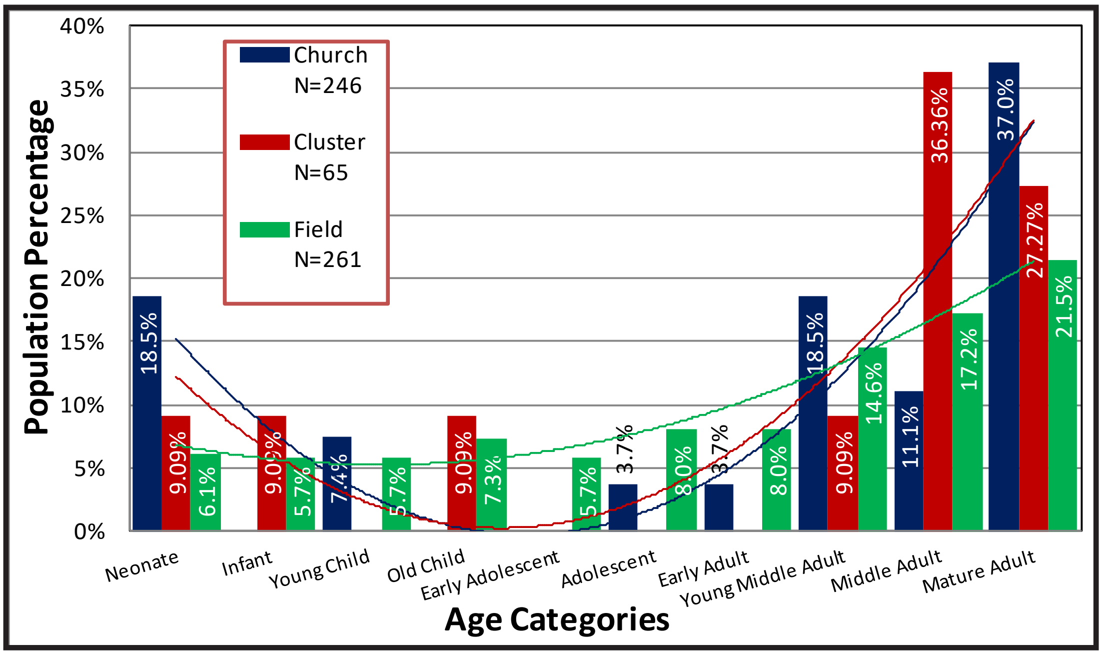

Figure 8.4, Mortality Curve for Site Types ('Adult' Group Not Included).

are imprecise when applied to adults. The physical body ages in a variety of ways that are specific to each individual person's epigenetics. It is not unusual for two people of the same chronological age to have a large gap in skeletal age (Cox 2000, Falys and Lewis 2011, Işcan and Kennedy 1989, Schmitt *et al*

2002). In addition, due to the quantity and quality of the material available to this research, the only native sites represented in this graph are Castle Park and Carlisle. Therefore, any of these mortality curves may show a bias of methodology and(or) sample bias, and not of actuality.

8.3 Sex

The male to female ratio for the entire assemblage is 115/104 respectively. This includes males and probable males as well as females and probable females. A chi^2 test indicates that the difference is not significant ($p=0.62$, $\chi^2=0.25$, $df=1$); however, there are a high number of individuals of indeterminate sex (118) which could potentially alter the ratio should biological sex ever be established for those individuals.

There is a similar pattern when separating the population by religious classifications (Fg 8.5). In this case there are slightly more females than males in the 'pagan' group, and more males than females in the 'Christian'. A chi^2 test indicates the difference is not significant ($p=0.532$, $\chi^2=2.201$, $df=3$).

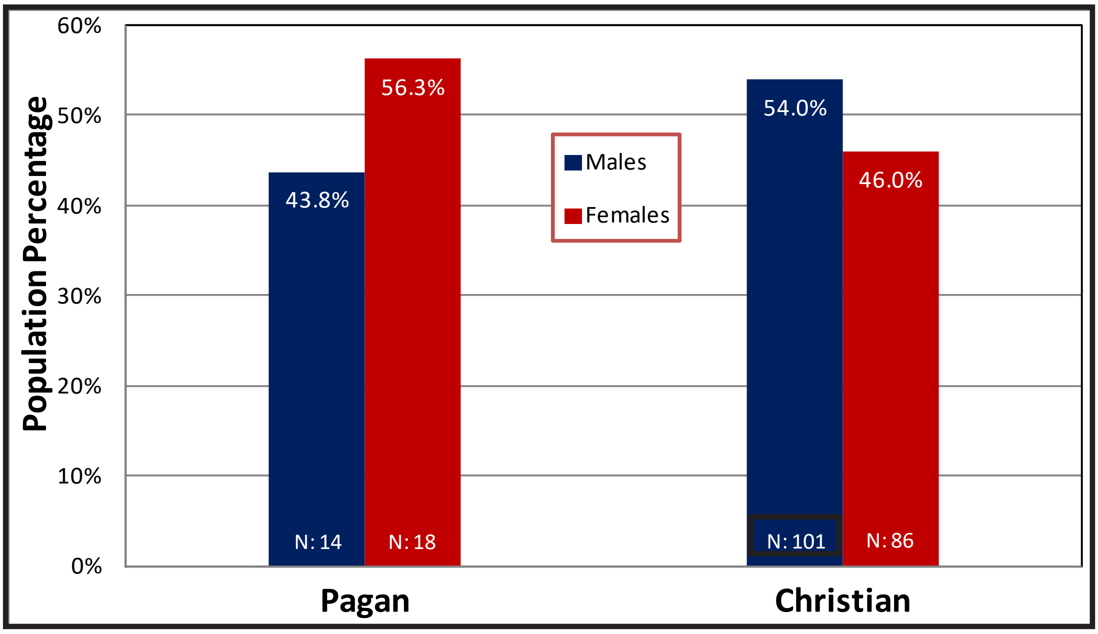

Figure 8.5, Percentage of Males and Females (including probable) by Religious Classification.

This is also the case when separating the population into ‘ethnicities’. There are slightly more males than females in the ‘Norse’ category and one more female than male in the ‘native’ (Fg 8.6). As expected, the difference is not significant (Chi² results: p=0.908, χ^2=0.551, df=3).

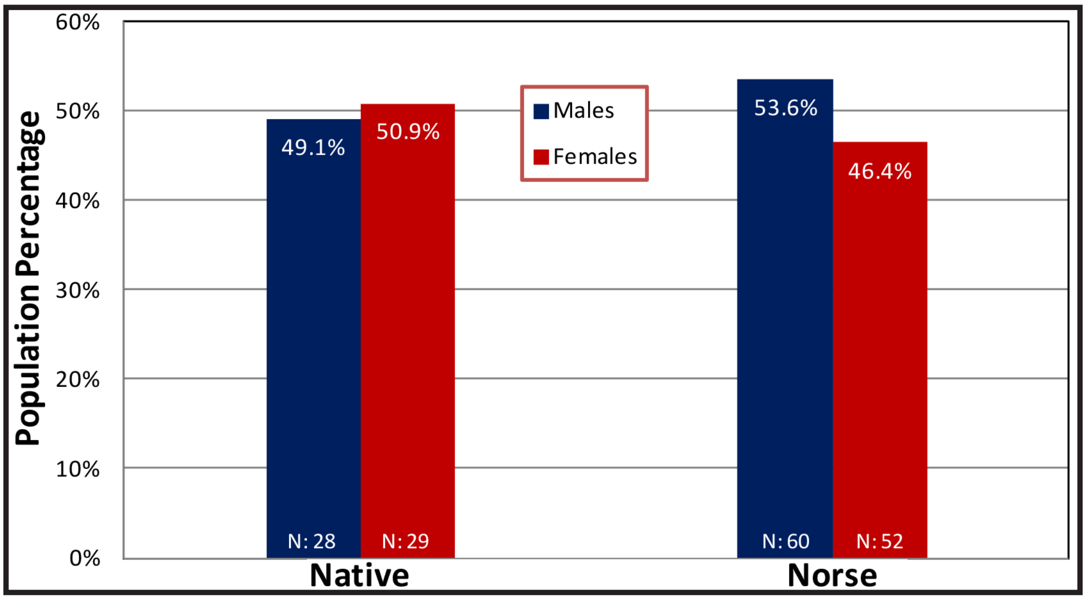

Figure 8.6, Percentage of Males and Females (including probable) by Ethnic Classification.

Differences in sex ratios by site type do show some variation (Fg 8.7). Chi² results do suggest that this is a significant result: p=0.031, χ^2=15.447,

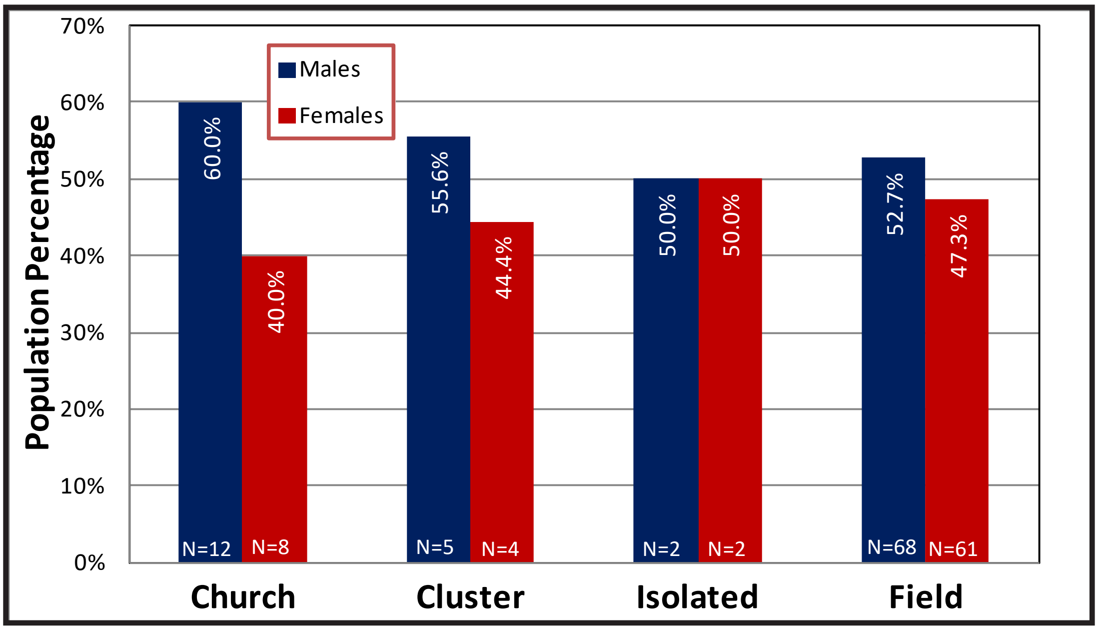

Figure 8.7, Percentage of Males and Females (including probable) by Site Type.

df=7. Note, however, that the number of individuals for the cluster and isolated groups are low and this may cause a bias in the results.

8.4 Cranial Metrics

Preservation of skeletal elements varied by individual and site. Eighty individuals yielded cranial elements complete enough to provide measurements for analysis. However, not all eighty produced the same measurements. Consequently, only 26 crania were comparable (Table 8.2). The contributing measurements are: GOP, EU-EU, ZY-ZY, BA-B BA-N, ECM-ECM, AU-AU, N-PR, N-NS, AL-AL, D-EC, OBH, N-B, B-L, L-O, PR-ALV, FT-FT, and FMT-FMT (see Section 5.3.4.1).

Site	Males N	Females N	Total N
Birsay	1	0	1
Breckness	2	0	2
Bustatoun	1	0	1
Castle Park	2	0	2
Cnip	1	1	2
Grutness	1	0	1
Iona	0	1	1
Newark	4	2	6
St. Ninian’s Isle	1	1	2
Sandwick	0	1	1
Skaill	0	1	1
Westness	0	6	6
		Total	**26**

Table 8.2, Number of Comparable Crania from this Research by Site and Sex.

A principle components analysis (PCA) of these crania by sex does suggest that there is a, not unexpected, differentiation by sex (Fg 8.8). PCA results by religion show a much less defined separation of the groups. The ‘Christian’ group does show a broader scatter than the ‘pagan’; however, the ‘pagan’ group fits generally within the ‘Christian’ scatter, suggesting there is considerable overlap between these groups (Fg 8.9); or in other words limited difference in the cranial phenotype.

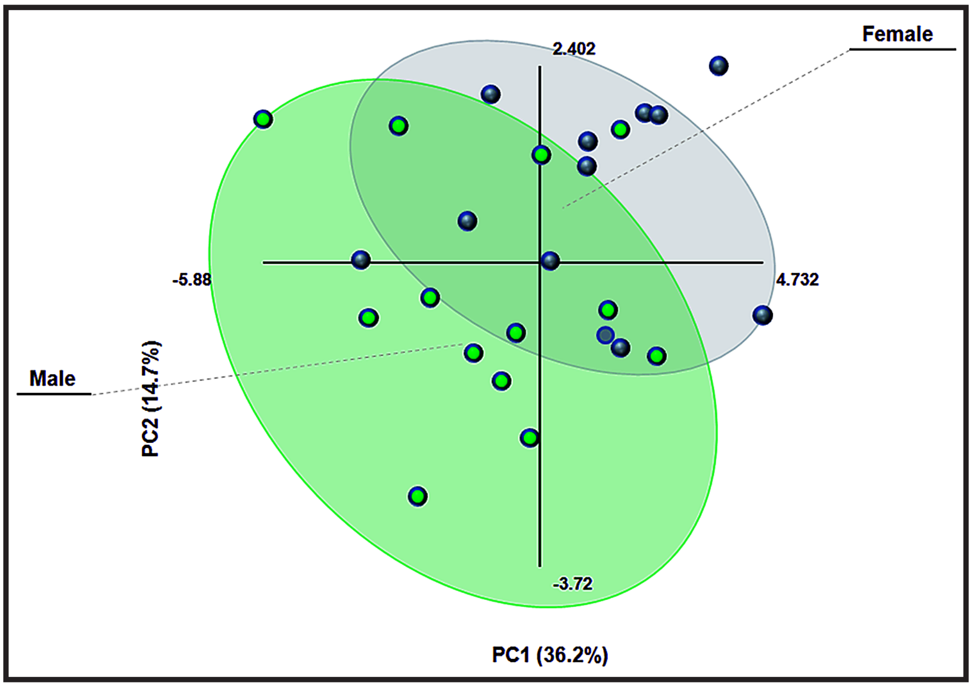

Figure 8.8, Plot of PCA Results for Crania in Assemblage by Sex.

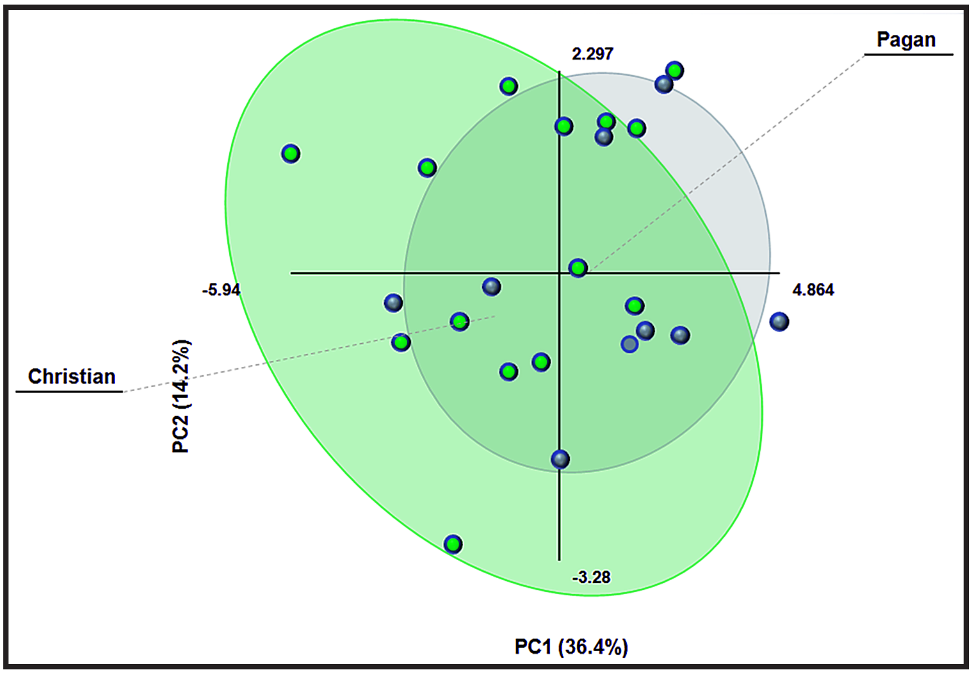

Figure 8.9, Plot of PCA Results for Crania in Assemblage by Religion.

An evaluation of the crania by ethnic categories also suggests that the division between ‘native’ and ‘Norse’ is not so easily separated (Fg 8.10). Although one of the ‘native’ individuals falls outside the ‘Norse’ scatter in the northeast quadrant of the graph, the remainder fall within the ‘Norse’ scatter,

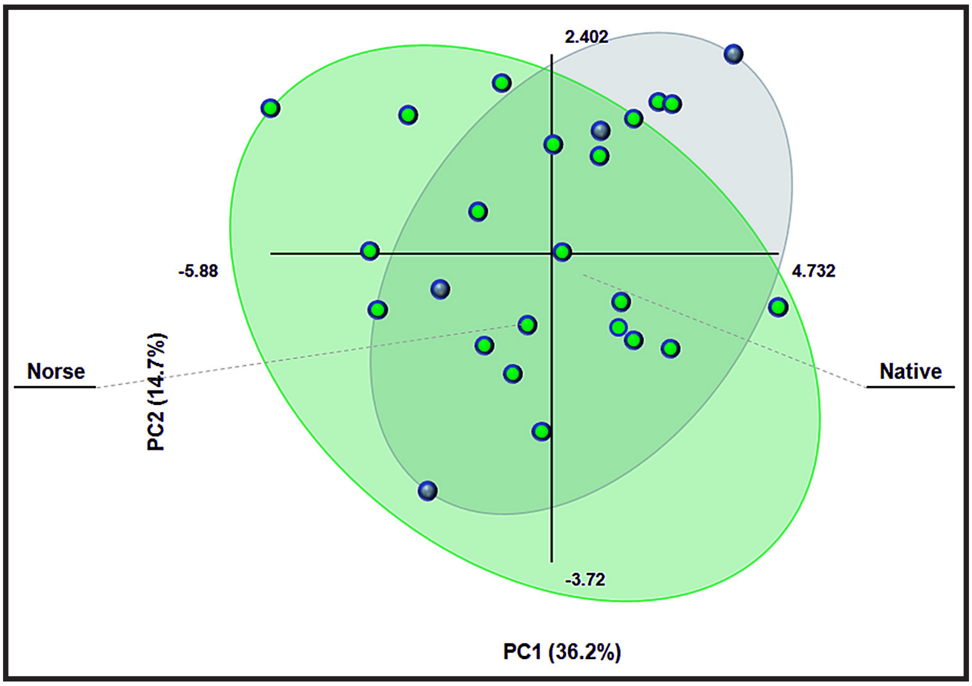

Figure 8.10, Plot of PCA Results for Crania in Assemblage by Ethnicity.

again suggesting a considerable overlap between these groups.

Among the cranial measurements in the Howells' data (Section 5.4) are measurements for the theoretically comparable populations of Zalavar, Berg, and Norse (Howells 1995, 1989, 1973). In theory, should the Norse who settled in Scotland be direct genetic descendants of the Norse/vikings from Norway, then analysis should show a correlation between the Scottish Norse and Howells' Norse, while showing a division between the native Scottish and the Howells' Norse. In addition, the vikings were world travellers and the possibility exists that many of the crew were from the disparate places to which the vikings travelled. Therefore, the two other European groups in the Howells data, Berg from central Europe (now Austria) and Zalavar (now in Hungary) were included to see if a correlation could be determined.

However, discriminate analysis suggests that the Scottish groups, native and Norse, do not correspond statistically with the Howells' groups: Zalavar, Berg, and Norse (the measurements PR-ALV, FT-FT, and FMT-FMT are not available for the Howells' crania and have been eliminated from evaluation).

Table 8.3 lists the classification summary for the groups. Note that individuals from the 'native' and the 'Norse' group were (mis)classified as each other, yet none of these individuals were (mis)classified as Berg, Norwegian or Zalavar. This suggests the Scottish crania are significantly different from the European (Howells).

Classified As	**True Group**				
	Berg	Native	Norse	Norwegian	Zalavar
Berg	86	0	0	6	8
Native	0	3	7	0	0
Norse	0	1	15	0	0
Norwegian	14	0	0	81	22
Zalavar	9	0	0	23	68
Total N	109	4	22	110	98
N Correct	86	3	15	81	68
Proportion	0.79	0.75	0.68	0.74	0.69
	N = 343		N Correct = 253	Proportion Correct = 0.74	

Table 8.3, Summary of Discriminant Analysis for the Early Mediaeval Scottish Crania and the Howells' Groups: Berg, Norse (listed above as Norwegian), and Zalavar.

Lastly, in looking at a graph of PC1 and PC2 performed on the crania by site type (Fg 8.11), the field group has the largest scatter with the church, isolated and unclassified crania falling within the field group's scatter. While

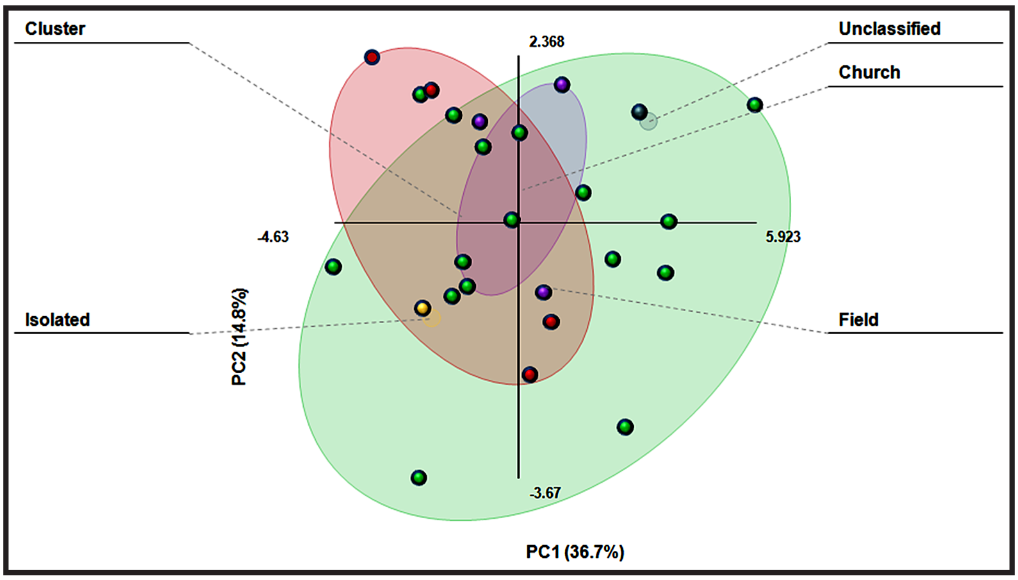

Figure 8.11, Plot of PCA Results for Crania in Assemblage by Site Type.

three of the small cluster individuals fall within the field group's scatter, one is outside the scatter in the northwest quadrant (note: two individuals are outside the confidence interval). This may indicate that; although there is some overlap between the small cluster and other site types, there is also some variation which could be detected statistically.

Again, the total number of crania was 26, resulting in the number of samples for each site type being even lower: 16 for the field category, one each for unclassified and isolated, three for church and four for small cluster. Thus, results from the cranial analyses should be taken with caution.

8.5 Stature

The majority of individuals in this study yielded incomplete skeletons. Therefore, stature was calculated from different longbones as they were available. Table 8.4 lists the individuals for which stature was calculated and which bone was used in that calculation. Stature estimations for the Bu of Cairston were taken from Stevens *et al* (2005) as shown in Figure 8.12.

Site	Individual	Sex	Bone	Stature (cm)
Birsay	CG2	F	Right Humerus	160.8 ± 4.45
	Buck1	M	Right Humerus	175.8 ± 4.57
	Buck2	M	Left Femur	169.5 ± 3.94
	1-2	M	Left Femur	162.7 ± 3.94
	1-3	M	Right Femur	164.7 ± 3.94
Breckness	1	M	Left Femur	162.5 ± 3.94
	2	M	Left Tibia	169.5 ± 4.00
	Broch	M	Right Ulna	166.3 ± 4.30
	EN405	M	Left Femur	167,4 ± 3.94
Bustatoun	1	M	Right Femur	159.7 ± 3.94
	2	M	Right Radius	178.2 ± 4.66
Captain's Cabin	04	F	Right Femur	163.0 ± 3.72
	2	F	Left Femur	160.6 ± 3.72
	4	F	Left Femur	152.2 ± 3.72
	24	F	Right Tibia	166.5 ± 3.66
	9	M	Right Femur	168.1 ± 3.94

Table 8.4, Calculated Stature of Entire Assemblage by Individual.

Site	Individual	Sex	Bone	Stature (cm)
Captain's Cabin, cont.	14	M	Right Femur	174.6 ± 3.94
	25	M	Right Femur	177.4 ± 3.94
	29	M	Right Humerus	166.0 ± 4.57
	33	F	Right Tibia	162.2 ± 3.66
	36	M	Left Humerus	170.6 ± 4.57
	38	M	Right Femur	168.6 ± 3.94
	44	F	Right Femur	149.9 ± 3.72
	44b	M	Left Tibia	163.5 ± 4.00
	45	M	Right Humerus	172.0 ± 4.57
	46	F	Right Femur	151.9 ± 3.72
	49	F	Left Femur	158.1 ± 3.72
	52	F	Right Femur	156.9 ± 3.72
	53b	F	Left Humerus	157.8 ± 4.45
	55	M	Right Femur	167.4 ± 3.94
	56	F	Left Humerus	160.5 ± 4.45
	57	F	Right Humerus	160.5 ± 4.45
	61	M	Right Femur	171.3 ± 3.94
	62	M	Right Femur	166.3 ± 3.94
	64	F	Right Femur	162.0 ± 3.72
	68	F	Right Femur	154.1 ± 3.72
	71	M	Right Femur	171.6 ± 3.94
	72	M	Right Humerus	169.1 ± 4.57
Carlisle	14	M	Right Femur	161.8 ± 3.94
	17	F	Right Humerus	161.5 ± 4.45
	54	M	Right Tibia	181.4 ± 4.00
	56	M	Right Femur	174.3 ± 3.94
Cnip	A	F	Right Femur	159.3 ± 3.72
	C	M	Right Femur	155.1 ± 3.94
	D	M	Right Femur	166.2 ± 3.94
	E	F	Right Femur	161.3 ± 3.72
John o' Groats	15	F	Left Ulna	157.7 ± 4.30
	19	M	Right Femur	160.4 ± 3.94
	21	M	Right Femur	173.2 ± 3.94
	D5	F	Left Tibia	165.3 ± 3.66
	D7	M	Right Femur	170.6 ± 3.94
Newark	1	F	Right Femur	155.9 ± 3.72
	2	M	Right Femur	164.6 ± 3.94
	7	M	Right Humerus	164.2 ± 4.57
	11	M	Left Humerus	169.1 ± 4.57
	68-8	F	Right Tibia	164.5 ± 3.66
	68-28	M	Right Tibia	170.0 ± 4.00

Table 8.4, Calculated Stature of Entire Assemblage by Individual, cont.

Site	Individual	Sex	Bone	Stature (cm)
Newark, cont.	68-31	F	Right Humerus	162.1 ± 4.45
	69-7	M	Left Humerus	177.2 ± 4.57
	69-26	M	Right Femur	174.6 ± 3.94
	69-28	M	Right Humerus	174.9 ± 4.57
	69-32	F	Right Femur	153.6 ± 3.72
	69-87	M	Right Femur	178.3 ± 3.94
	69-98	F	Right Femur	162.3 ± 3.72
	70-29	F	Right Femur	161.3 ± 3.72
	70-7	M	Right Humerus	169.5 ± 4.57
	70ab	M	Right Femur	175.0 ± 3.94
	71-11	M	Right Tibia	172.2 ± 4.00
	NB1	M	Right Femur	174.3 ± 3.94
	TM7	F	Right Femur	160.6 ± 3.72
Sandwick	270	F	Right Femur	166.0 ± 3.72
Scar	134	M	Right Tibia	181.6 ± 4.00
Skaill House	1	M	Right Femur	157.4 ± 3.94
St. Ninian's, Bute	1	F	Right Femur	159.8 ± 3.72
	3a	F	Right Femur	154.4 ± 3.72
St. Ninian's Isle	1	M	Right Femur	159.3 ± 3.94
	2	F	Right Femur	169.5 ± 3.72
	3	M	Right Humerus	176.7 ± 4.57
	5	M	Right Tibia	166.6 ± 4.00
	Hubert	M	Right Femur	176.2 ± 3.94
	Rosemary	M	Right Femur	168.3 ± 3.94
Westness	5	F	Right Humerus	150.4 ± 4.45
	6	F	Right Femur	153.6 ± 3.72
	7	F	Right Femur	164.5 ± 3.72
	8	F	Right Humerus	161.1 ± 4.45
	10	F	Right Femur	162.0 ± 3.72
	14	F	Right Femur	166.5 ± 3.72
	18	F	Right Femur	157.3 ± 3.72
	24	F	Right Femur	161.1 ± 3.72
	28a	F	Right Femur	161.0 ± 3.72
	30	F	Right Femur	161.8 ± 3.72
	32	F	Left Humerus	167.1 ± 4.45
	A	F	Left Humerus	169.8 ± 4.45
	B	F	Right Tibia	165.6 ± 3.66
	11	M	Right Femur	179.7 ± 3.94
	12	M	Right Radius	179.1 ± 4.66
	15	M	Left Radius	171.2 ± 4.66
	20	M	Right Femur	170.9 ± 3.94
	2a	M	Right Humerus	164.2 ± 4.57

Table 8.4, Calculated Stature of Entire Assemblage by Individual, cont.

Site	Individual	Sex	Bone	Stature (cm)
Westness, cont.	34	M	Left Femur	180.4 ± 3.94
	9	M	Right Fibula	166.2 ± 3.86
	Naust	M	Right Femur	170.2 ± 3.94

Table 8.4, Calculated Stature of Entire Assemblage by Individual, cont.

		Males		*Females*	
Context number	*Metrics used*	*Stature estimation (m)*	*Standard error (m)*	*Stature estimation (m)*	*Standard error (m)*
015	Femoral length	–	–	1.67	±3.72
064	Femoral length	1.76	±3.94	–	–
074	Femoral length	1.79	±3.94	–	–
110	Femoral length	1.65	±3.94	–	–
154	Radial length	–	–	1.54	±4.24
157	Radial length	–	–	1.56	±4.24
164	Femoral length	–	–	1.58	±3.72
189	Radial length	–	–	1.56	±4.24
243	Femoral length	–	–	1.56	±4.24
263	Femoral length	1.62	±3.94	–	–
326	Femoral length	1.74	±3.94	–	–
370	Femoral length	1.59	±3.94	–	–

Figure 8.12, Stature Estimations from Bu of Cairston (Modified from Stevens *et al* 2005: 387).

Table 8.5 gives the mean statures for the sexes by religious classification. Figure 8.13 illustrates these statistics in an interval plot. As a whole, the ‘pagan’ group has a broader stature range than the ‘Christian’ group. However, an hierarchical general linear model (HGLM) shows that the significant difference lies in sex and not in religious grouping (Table 8.6).

	Christian Female	Pagan Female	Christian Male	Pagan Male
Mean	159.89	161.06	170.11	170.17
Interval (95%)	157.43-160.34	158.32-163.81	168.51-171.71	166.80-173.55
N	35	16	47	19

Table 8.5, Statistics for Interval Plot of Stature by Religious Classification.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	3208.53	49.29%	3208.53	3208.53	111.76	0.001
Error	115	3301.54	50.71%	3301.54	28.71		
Lack-of-Fit	2	52.22	0.80%	52.22	26.11	0.91	0.406
Pure Error	113	3249.32	49.91%	3249.32	28.76		
Total	116	6510.07	100.00%				

Table 8.6, ANOVA Results from an HGLM for Stature by Religion.

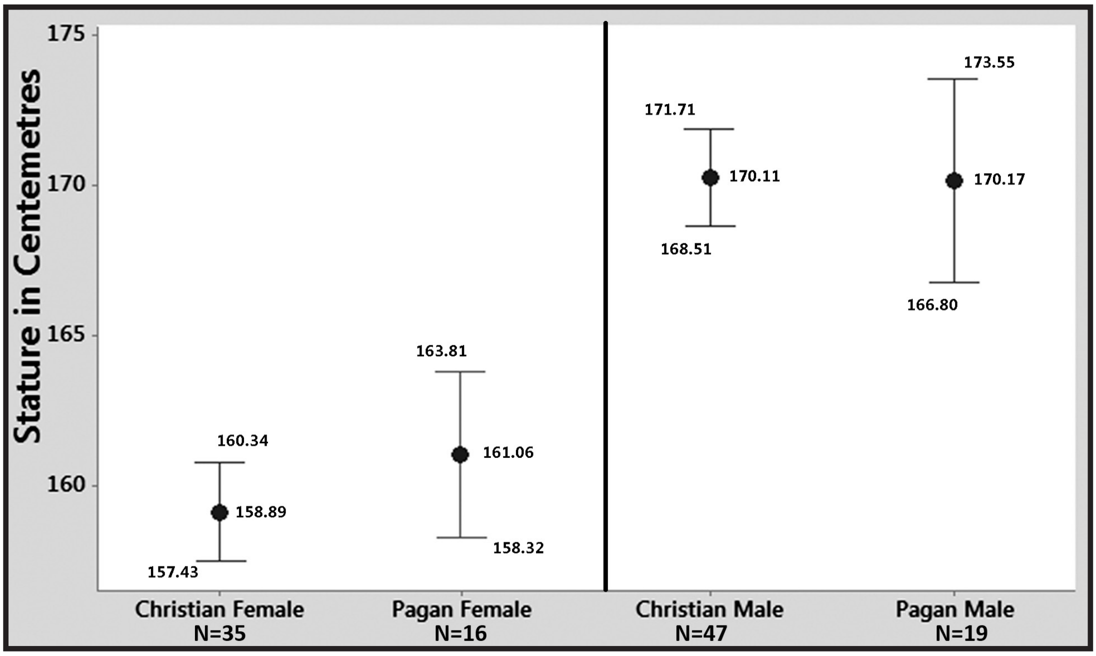

Figure 8.13, Interval Plot of Stature by Religious Classification.

Table 8.7 gives the mean statures for males (and probable males) and females (and probable females) by ethnic classification. The 'native' group shows a slightly broader range of statures (Fg 8.14); however, an HGLM again indicates that sex is the most significant factor in group division, not ethnic classification (Table 8.8).

	Native Female	Norse Female	Native Male	Norse Male
Mean	158.77	160.18	170.53	170.09
Interval (95%)	156.41-161.34	158.58-161.77	167.71-173.36	168.34-171.84
N	18	34	15	50

Table 8.7, Statistics for Interval Plot of Stature by Ethnic Classification.

Factor coding -1, 0, +1		Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15					
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	3185.23	48.93%	3185.23	3185.23	110.17	0.001
Error	115	3324.84	57.01%	3324.84	28.91		
Lack-of-Fit	2	25.50	0.39%	25.50	12.75	0.44	0.647
Pure Error	113	3299.34	50.68%	3299.34	29.20		
Total	116	6510.07	100.00%				

Table 8.8, ANOVA Results from an HGLM for Stature by Ethnicity.

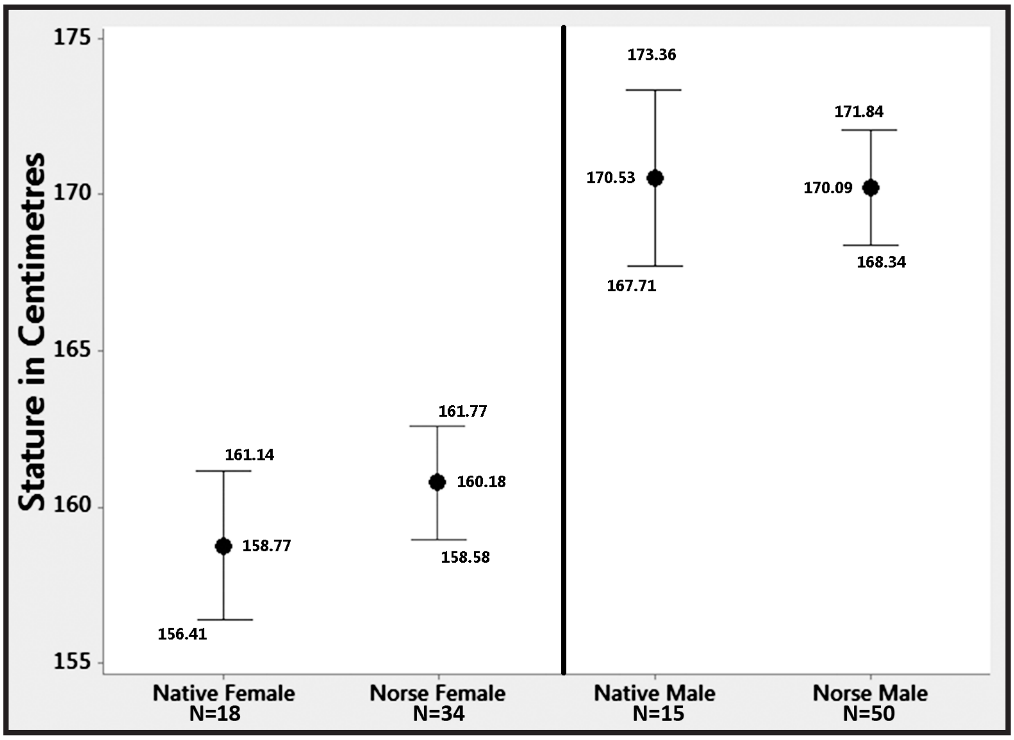

Figure 8.14, Interval Plot of Stature by Ethnicity Classification.

Lastly, in separating groups by site type, the small cluster group has the broadest range of statures (Table 8.9, Fg 8.15). Once more an HGLM indicates that it is sex which is the most statistically significant division and not the separation by site type (Table 8.10). However, it should be noted that the number of individuals in both the church and the small cluster categories is low (total N=12 and 7 respectively). This suggests a potential change to the results, should a more statistically viable number of individuals be located.

		Church	Field	Small Cluster	Unclassified
Female	**Mean**	158.75	159.72	160.13	166.7
	Interval	153.90-163.60	158.25-161.20	146.48-173.8	159.21-174.19
	N	4	44	3	5
Male	**Mean**	171.85	170.46	166.35	-
	Interval	166.50-177.20	168.81-172.10	153.03-179.67	-
	N	8	47	4	-

Table 8.9, Statistics for Interval Plot of Stature by Site Type.

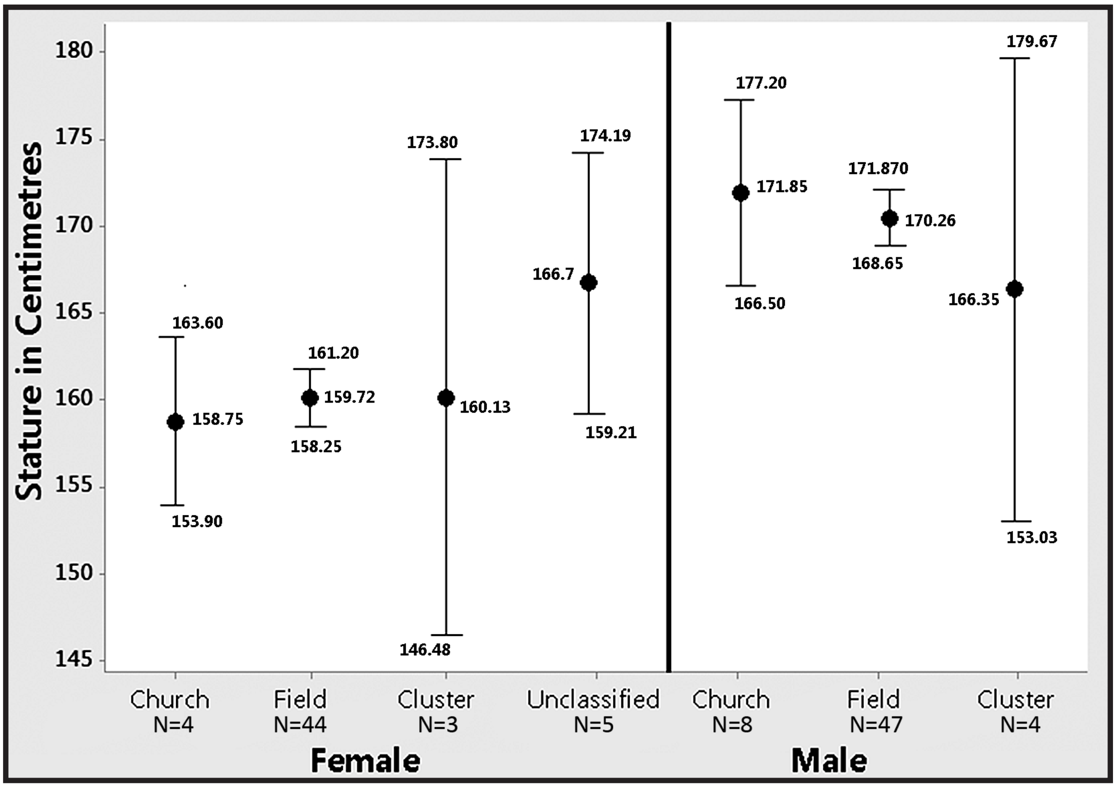

Figure 8.15, Interval Plot of Stature by Site Type. No Data Available for Unclassified Males.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	3075.6	49.21%	3075.6	3075.6	109.50	0.001
Error	113	3173.7	50.79%	3173.7	28.09		
Lack-of-Fit	6	102.1	1.63%	102.1	17.02	0.59	0.735
Pure Error	107	3071.6	49.15%	3071.6	28.71		
Total	114	6249.3	100.00%				

Table 8.10, ANOVA Results from an HGLM for Stature by Site Type.

Stature differences based on sex are not unexpected. In addition, although the different groups are not statistically distinct, the large range of statures found in certain group divisions; ie: 'pagan' (vs 'Christian'), 'native' (vs 'Norse'), and particularly small cluster sites (vs other site types), is notable. Terminal stature is determined by a number of factors. Genetics certainly play a significant part; however, geography and environment, diet, disease and health all play a critical part as well (Aamodt and Wang 2012, Camara and Garcia-Roman 2014, Steckel 2012). The reason for this broader variation in height may be due to any or all of these components. Further investigation would be needed to establish the importance, if any, of this anomaly.

8.6 Limb Proportions

Section 4.5.2 outlines the connection between limb proportions and identity. The brachial, crural, cnemic and meric indices were calculated and analysed for the religious, ethnic and site type groups. Results follow below.

8.6.1 Brachial

The brachial index was calculated for individuals with complete humeri and radii. This data was not available for the Bu of Cairston, and thus it is not included. For individuals with both sets of longbones, the mean was used. Comparing indices by religious grouping shows that 'pagans' have a slightly higher index than 'Christians' (Figures 8.16 and 8.17). The slopes for males are similar to those of females.

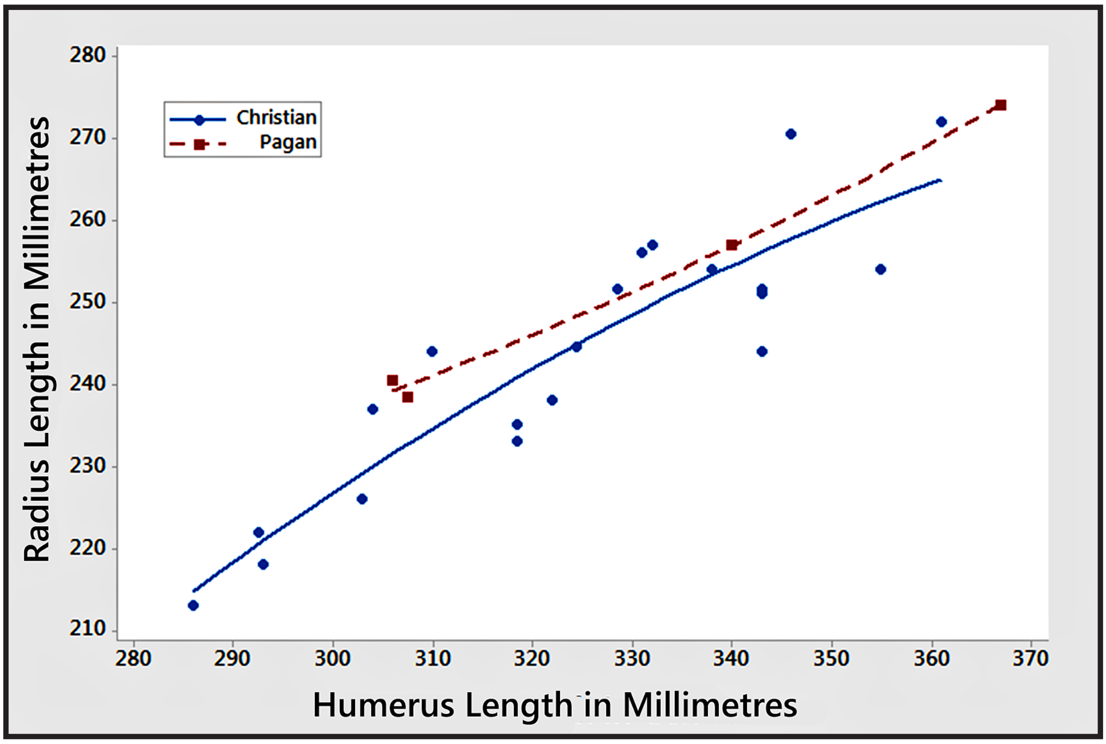

Figure 8.16, Scatter Plot of Brachial Index by Religion for Males. Cubed Slope (best fit) Given.

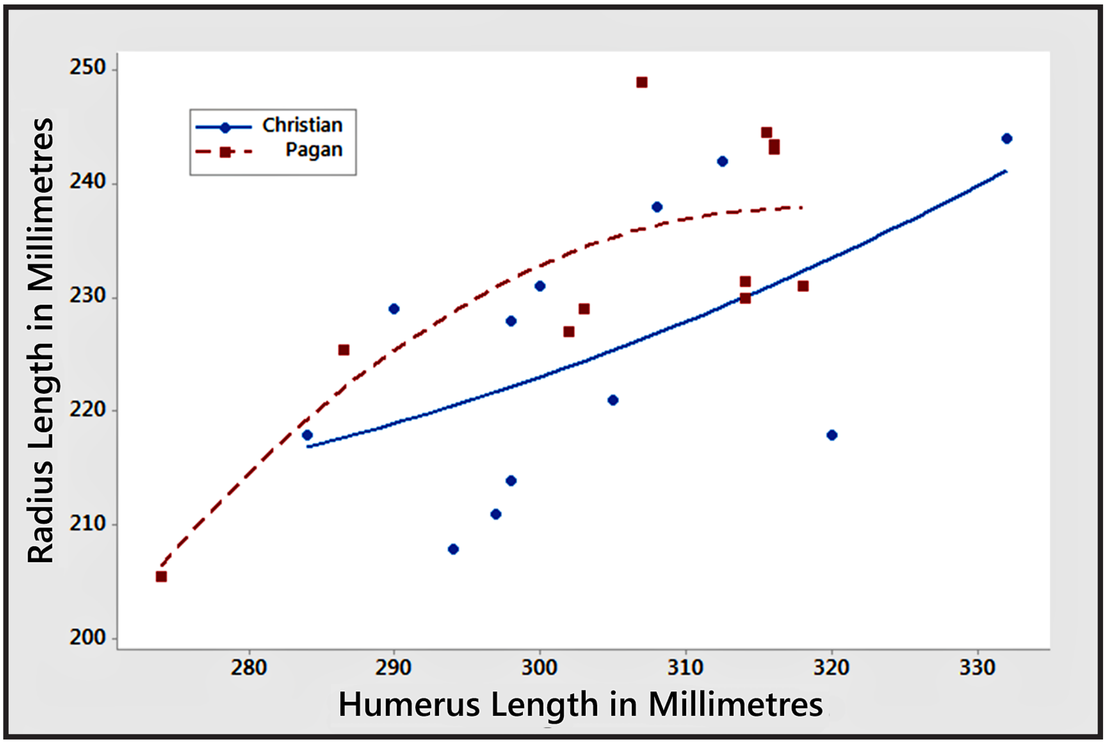

Figure 8.17, Scatter Plot of Brachial Index by Religion for Females.
Cubed Slope (best fit) Given.

HGLM indicates that religious classification is significant in group separation; although, not statistically so (Table 8.11).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Religion	1	25.53	7.47%	25.53	25.531	3.72	0.060
Error	46	316.05	92.53%	316.05	6.871		
Lack-of-Fit	2	10.26	3.00%	10.26	5.129	0.74	0.484
Pure Error	44	305.79	89.52%	305.79	6.950		
Total	47	341.58	100.00%				

Table 8.11, ANOVA Results from an HGLM for Brachial Index by Religion.

Scatter plots of the brachial indices by ethnic group show there is little difference between males (Fg 8.18). There is, however, a more contracted index range for ‘native’ females than for the ‘Norse’ (Fg 8.19). HGLM reveals neither sex nor ethnicity is determinative for separating groups.

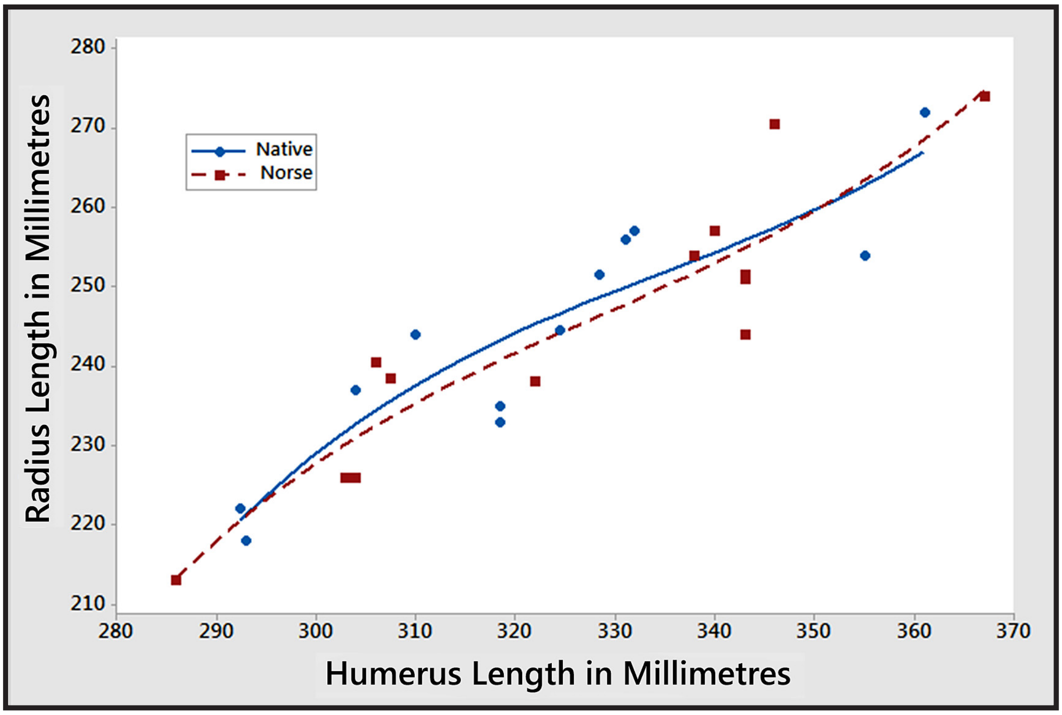

Figure 8.18, Scatter Plot of Brachial Index by Ethnicity for Males. Cubed Slope (best fit) Given.

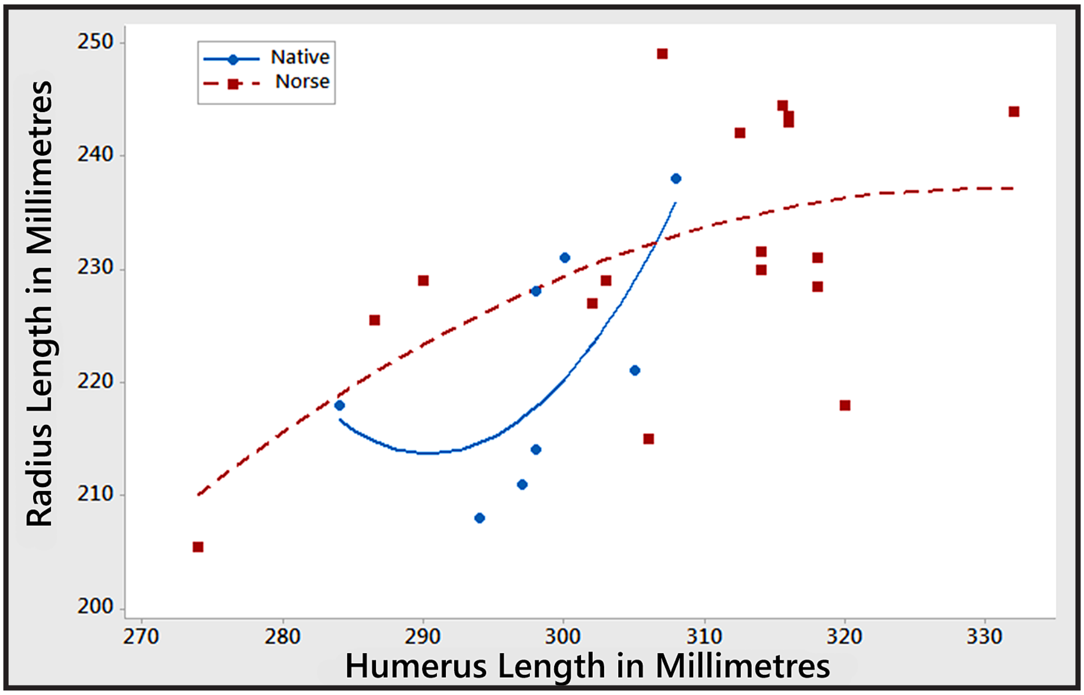

Figure 8.19, Scatter Plot of Brachial Index by Ethnicity for Females.
Cubed Slope (best fit) Given.

HGLM for brachial indices by site type also showed that neither sex nor site type were more determinative in distinguishing groups. Females show a broader scatter pattern overall (Fg 8.20) when compared to males (Fg 8.21).

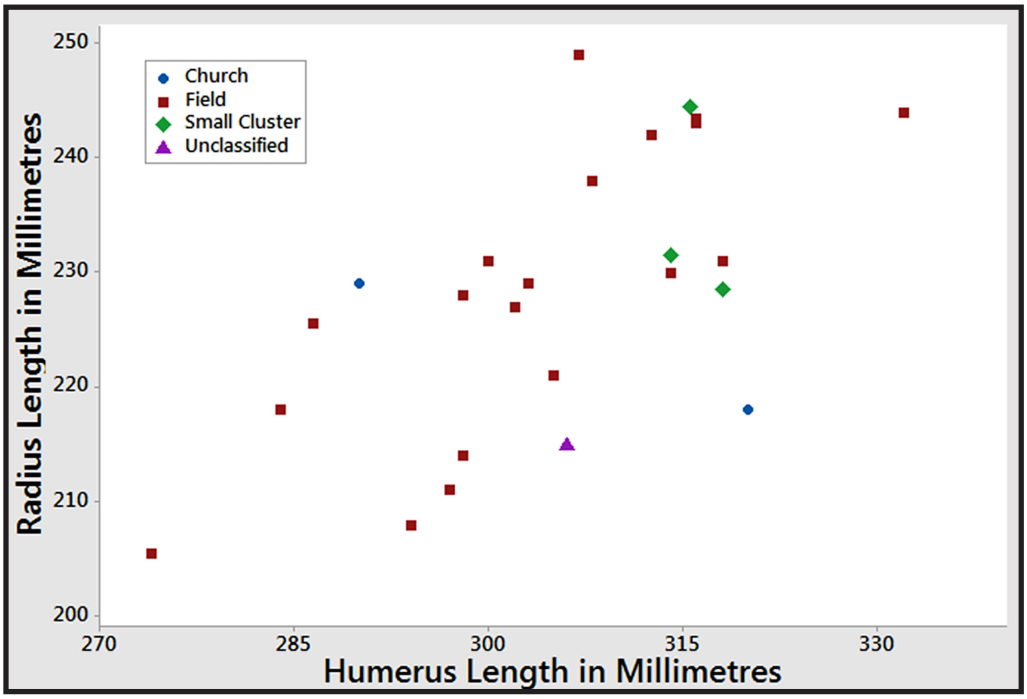

Figure 8.20, Scatter Plot of Brachial Index by Site Type for Females.
Slopes not Given to Simplify Visual Illustration.

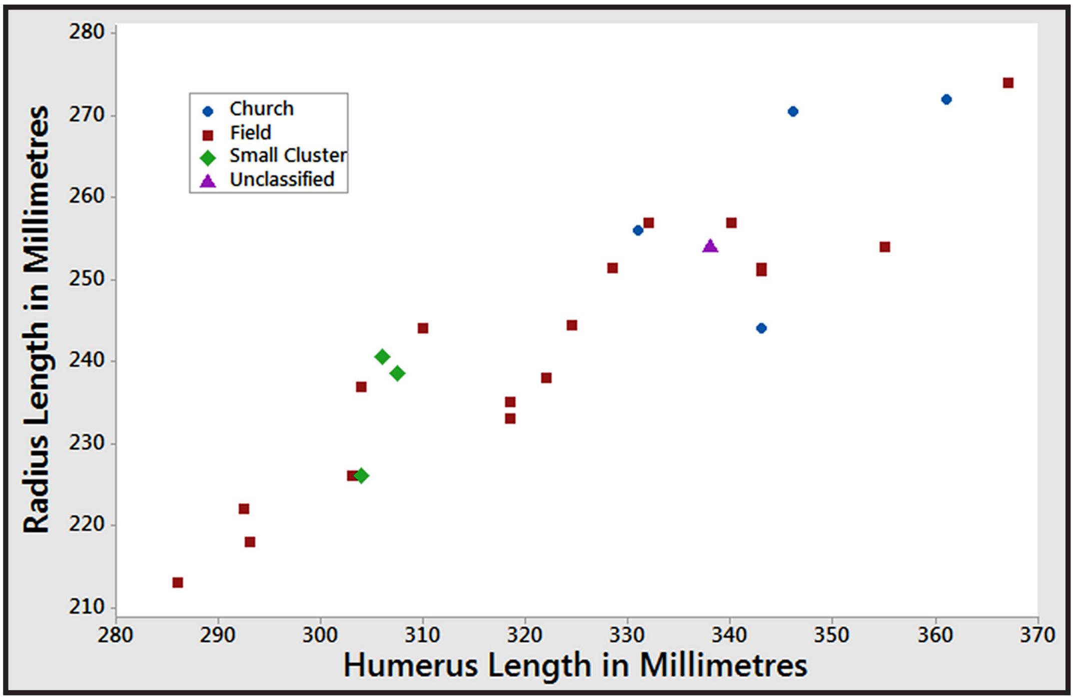

Figure 8.21, Scatter Plot of Brachial Index by Site Type for Males.
Slopes not Given to Simplify Visual Illustration.

However, the number of individuals in the non-field groups is low (total N Church=6, total N Small Cluster=6, and total N Unclassified=2). More data from individuals in these groups may change the results of such an analysis, should this data become available in the future.

8.6.2 Crural Index

The crural index was calculated for individuals with complete femora and tibiae. As with the brachial indices, this information was not available for the Bu of Cairston and this site is not included. For individuals with both sets of long bones, the mean was used.

In separating the population by religion, scatter plots show that the 'pagan' group has a slightly wider range of indices for both sexes than the 'Christian' group (Fgs 8.22 and 8.23). HGLM reveals neither religion nor sex to be important for distinguishing group differences.

Comparing groups by ethnic classification produces similar results as the analyses by religion. In this case, the 'Norse' group produced higher indices than the 'native' groupings (Fgs 8.24 and 8.25). In addition, 'Norse' males

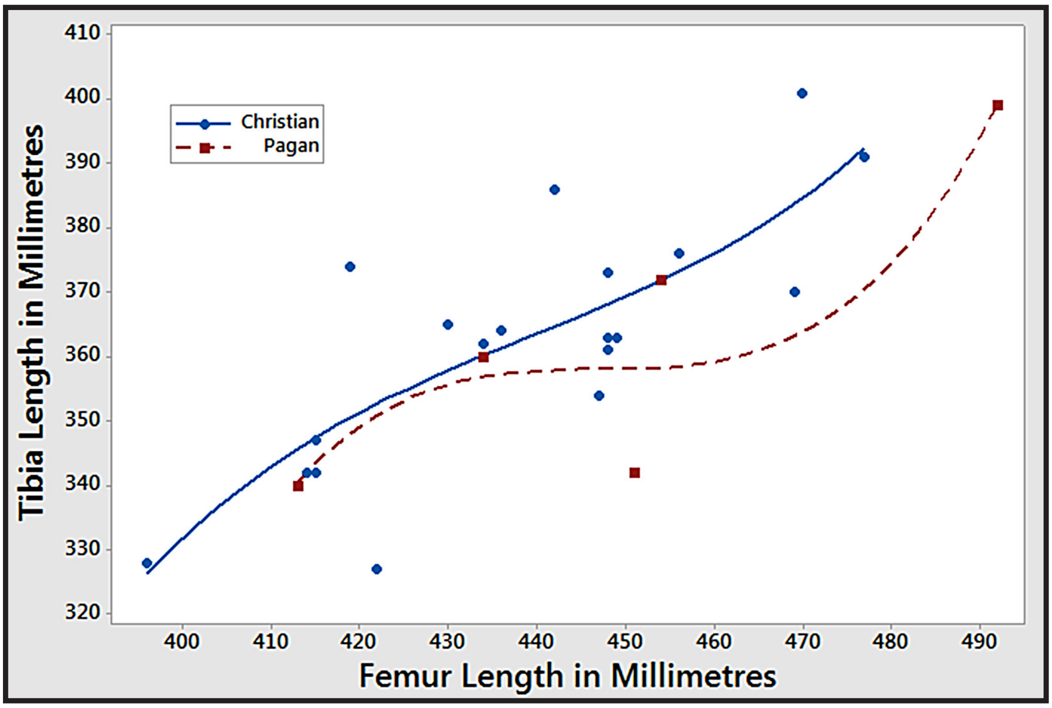

Figure 8.22, Scatter Plot of Crural Index by Religion for Males. Cubed Slope (best fit) Given.

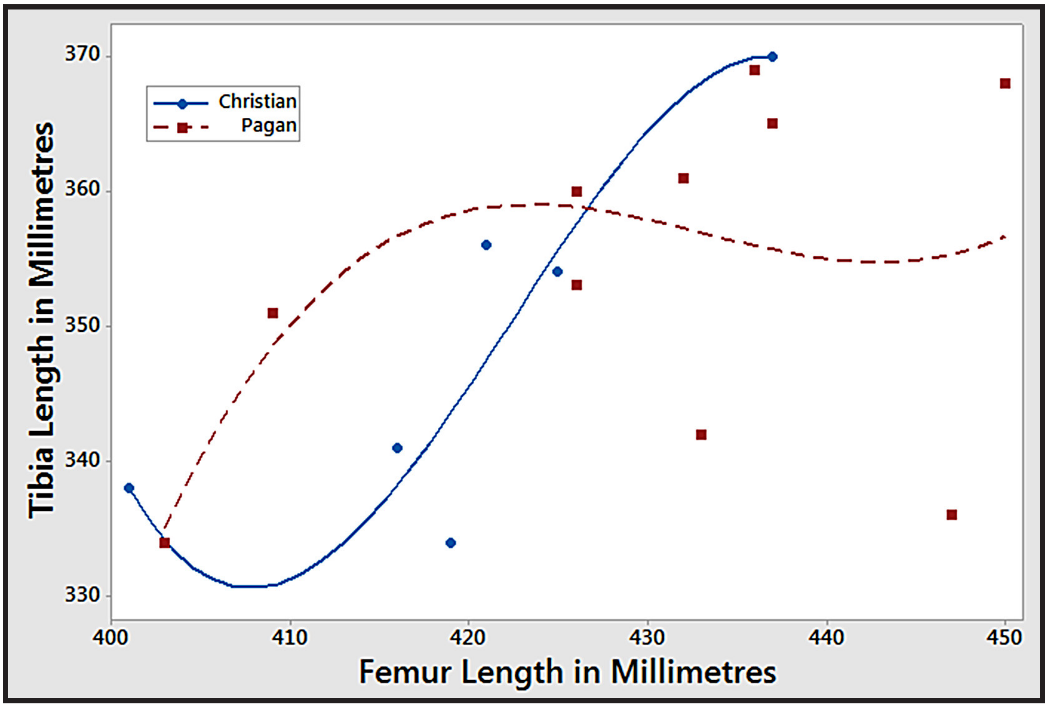

Figure 8.23, Scatter Plot of Crural Index by Religion for Females. Cubed Slope (best fit) Given.

showed a broader range at both ends of the spectrum when compared to ‘native’ males. As with the religious groupings, HGLM analysis reveals neither ethnicity nor sex to be of more import for distinguishing between groups.

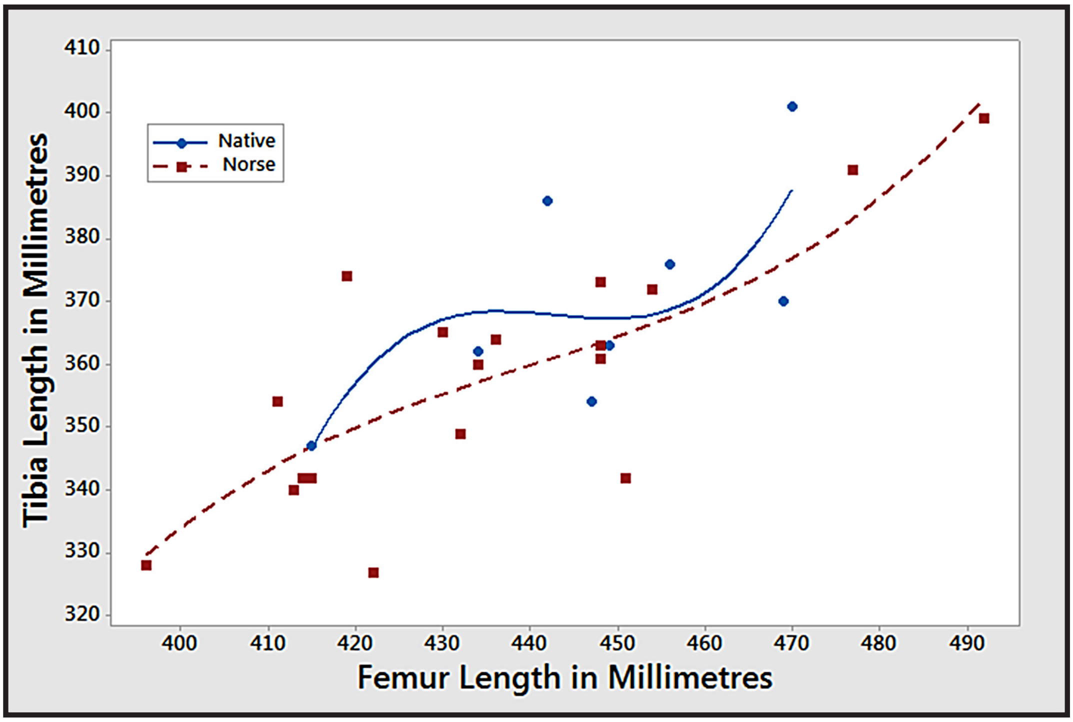

Figure 8.24, Scatter Plot of Crural Index by Ethnicity for Males. Cubed Slope (best fit) Given.

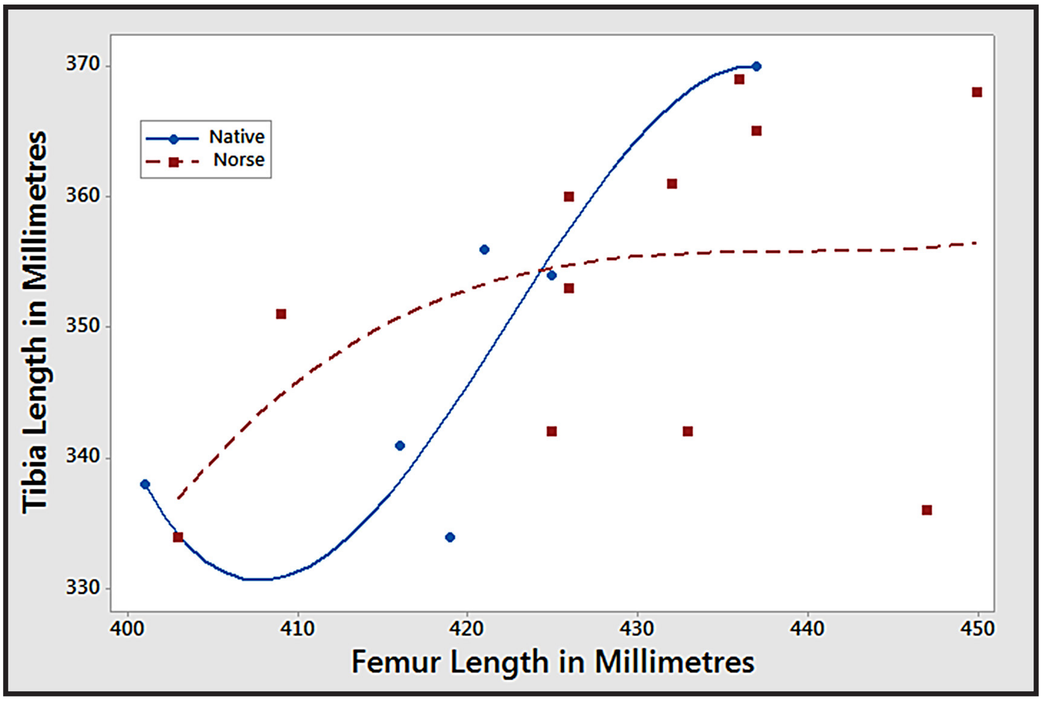

Figure 8.25, Scatter Plot of Crural Index by Ethnicity for Females. Cube Slope (best fit) Given.

Analysing the population by site type indicates that females show a broader scatter pattern overall (Fg 8.26) when compared to males (Fg 8.27). HGLM results suggest that neither site type nor sex is key in group

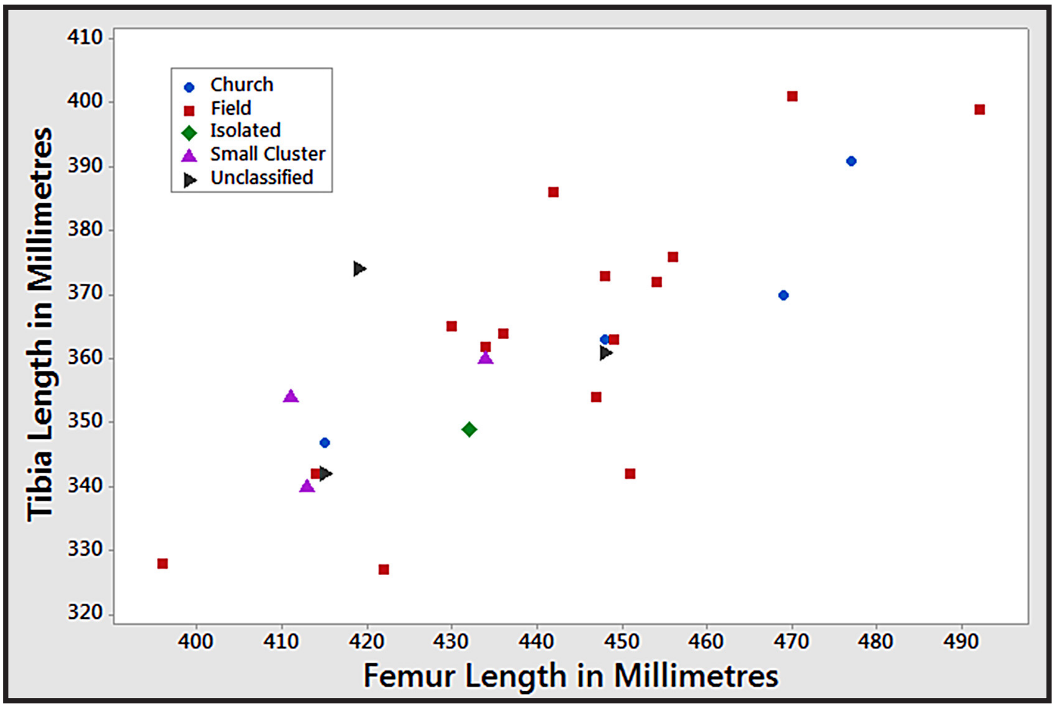

Figure 8.26, Scatter Plot of Crural Index by Site Type for Males.
Slopes not Given to Simplify Visual Illustration.

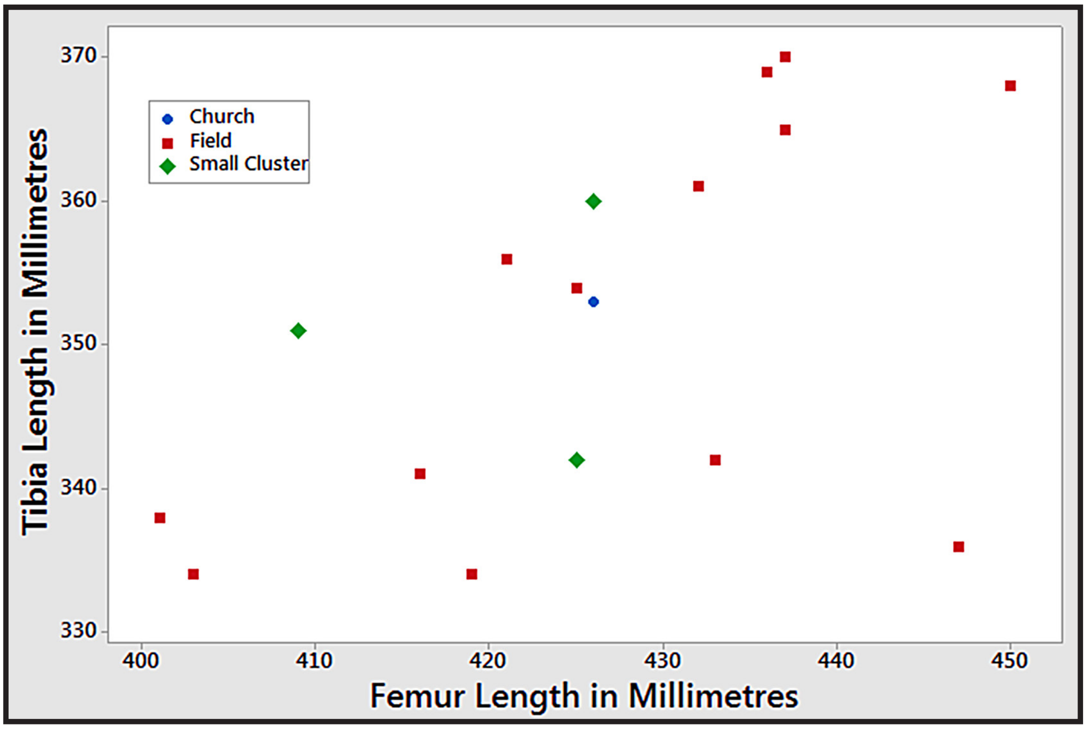

Figure 8.27, Scatter Plot of Crural Index by Site Type for Females.
Slopes not Given to Simplify Visual Illustration.

separation. Like the brachial sample, the number of individuals in the non-field groups is low (total N Church=5, Isolated=1, Small Cluster=6, and Unclassified=3). Results may change should this number ever increase.

8.6.3 Meric Index

The meric index was calculated for individuals with extant femora. For individuals with both femora present, the mean index was used. Comparing indices by religious group shows that 'Christian' males have a broader range of femoral circumferences than males in the 'pagan' group (Fg 8.28). Both sexes have relatively equivalent indices within the religious groups (Females Fg 8.29); however, HGLM indicates that religious classification and sex are both significant in group separation (Table 8.12). This may be in part due to the separation of the unclassified and 'pagan' males, both of which fall within the 'Christian' range and yet do not overlap each other.

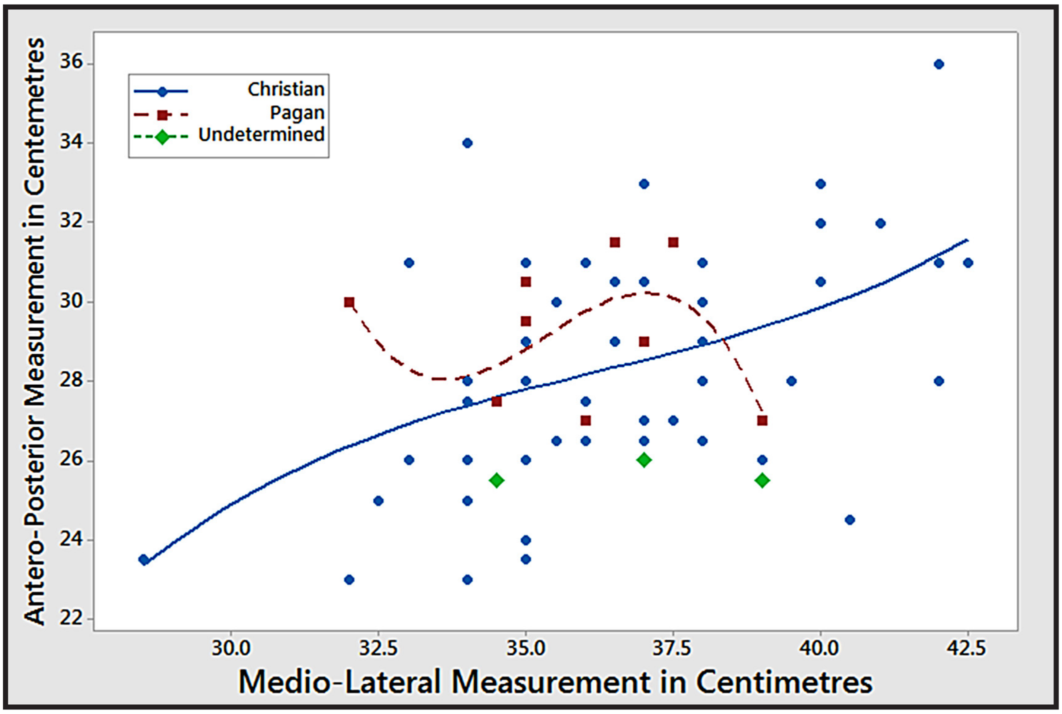

Figure 8.28, Scatter Plot of Meric Index by Religion for Males. Cubed Slope (best fit) Given.

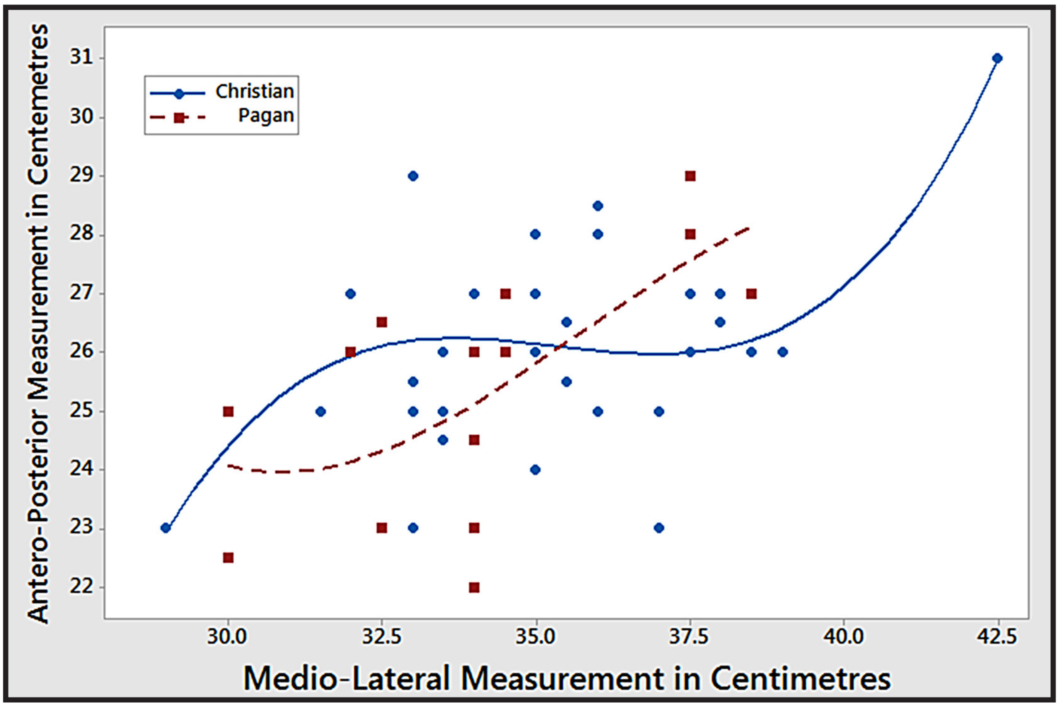

Figure 8.29, Scatter Plot of Meric Index by Religion for Females. Cubed Slope (best fit) Given.

HGLM by ethnicity indicates that sex is the most important for separation of these groups (Table 8.13).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter=0.15, α to remove=0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Religion	2	161.90	2.90%	275.90	137.95	2.93	0.058
Sex	1	428.69	7.68%	428.69	428.69	9.11	0.003
Error	106	4988.84	89.41%	4988.84	47.06		
Lack-of-Fit	1	62.11	1.11%	62.11	62.11	1.32	0.253
Pure Error	105	4926.73	88.30%	4926.73			
Total	109	5579.43	100.00%				

Table 8.12, ANOVA Results from an HGLM for Meric Index by Religion.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter=0.15, α to remove=0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	349.02	6.14%	349.02	349.02	7.13	0.009
Error	109	5335.09	93.86%	5335.09	48.95		
Lack-of-Fit	2	57.13	1.01%	57.13	28.57	0.58	0.562
Pure Error	107	5277.95	92.85%	5277.95			
Total	110	5684.10	100.00%				

Table 8.13, ANOVA Results from an HGLM for Meric Index by Ethnicity.

Scatter plots based on ethnic groups show that the ‘native’ group tends to have larger femoral circumferences than the ‘Norse’; although there is considerable overlap in indices (Fgs 8.30 and 8.31).

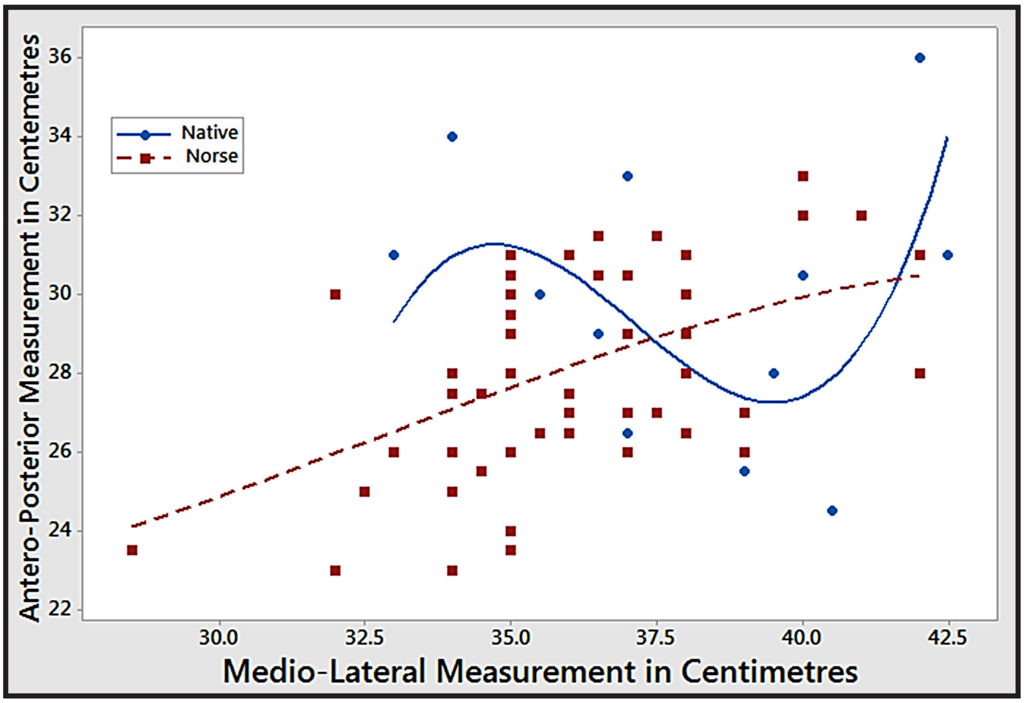

Figure 8.30, Scatter Plot of Meric Index by Ethnicity for Males. Cubed Slope (best fit) Given.

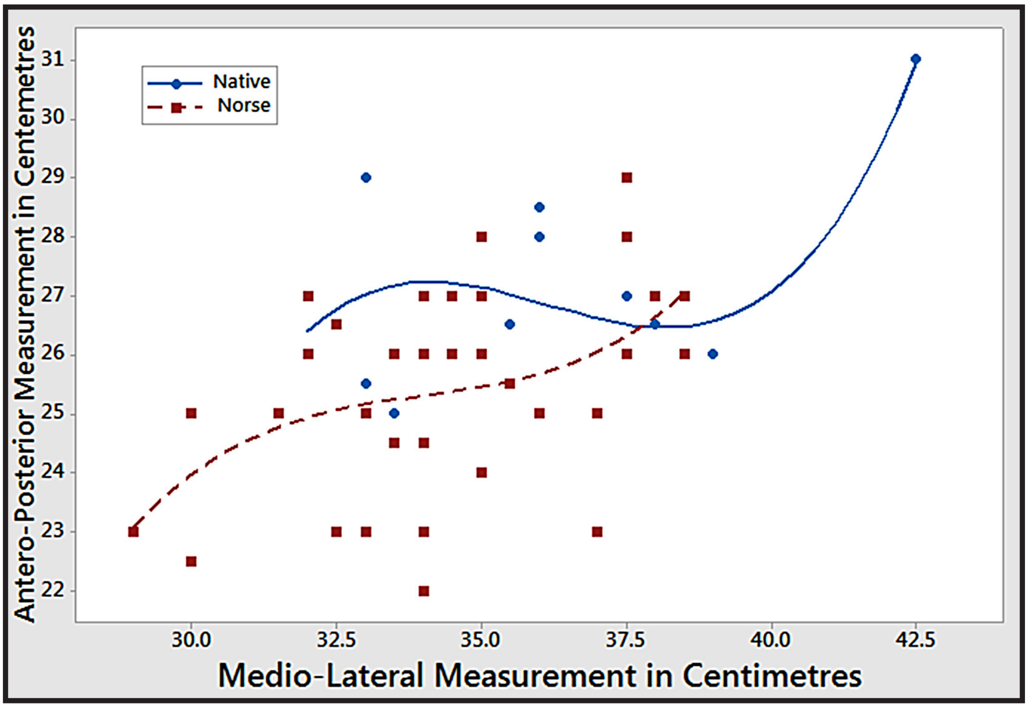

Figure 8.31, Scatter Plot Meric Index by Ethnicity for Females. Cubed Slope (best fit) Given.

Scatter plots do suggest a subtle variation between the site types (Fg 8.32 and 8.33). However, HGLM also shows that it is again sex which is the primary determiner of group distinction when evaluating site type (Table 8.14).

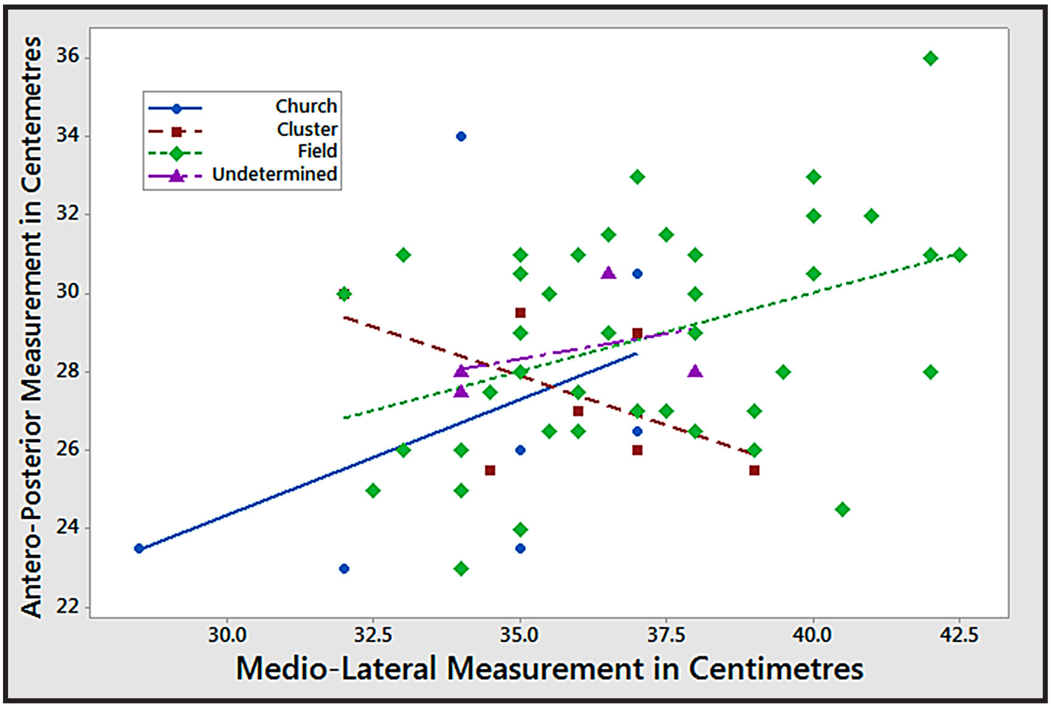

Figure 8.32, Scatter Plot of Meric Index by Site Type for Males. Linear Slope (best fit) Given.

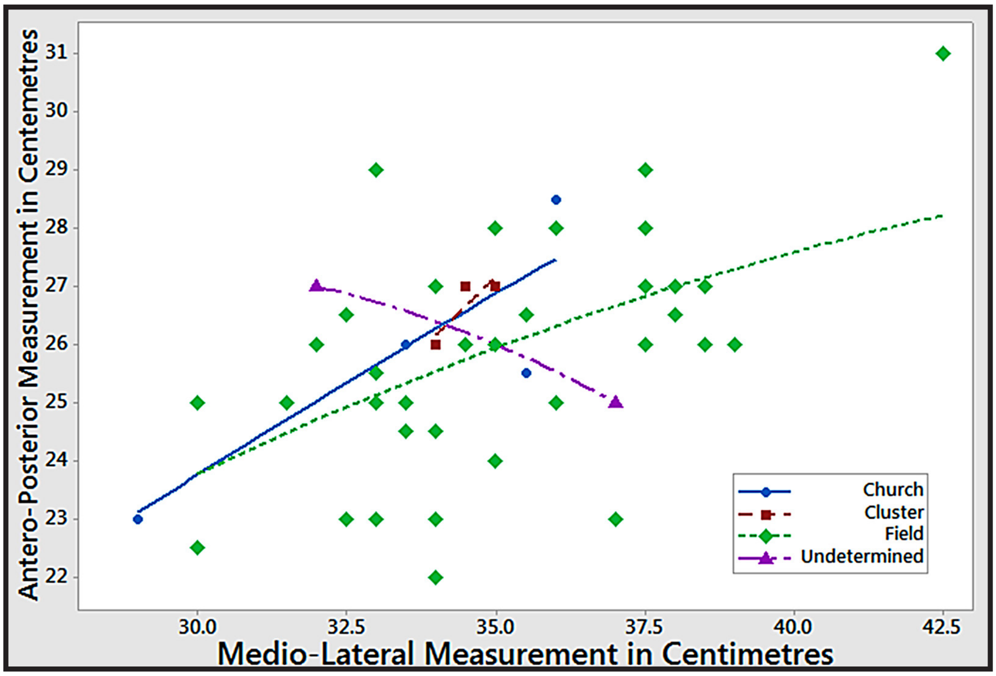

Figure 8.33, Scatter Plot of Meric Index by Site Type for Females. Cube Slope (best fit) Given.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	314.69	5.64%	314.69	314.69	6.46	0.012
Error	108	5264.74	94.36%	5264.74	48.75		
Lack-of-Fit	6	91.33	1.64%	91.33	15.22	0.30	0.936
Pure Error	102	5173.41	92.72%	5173.41	50.72		
Total	109	5579.43	100.00%				

Table 8.14, ANOVA Results from an HGLM for Meric Index by Site Type.

8.6.4 Cnemic Index

The cnemic index was calculated for individuals with extant tibiae. For individuals with both tibiae present, the mean index was used.

HGLM indicates religion is a significant separator of groups (Table 8.15).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Religion	2	216.91	10.30%	216.91	108.456	4.48	0.014
Error	78	1889.67	89.70%	1889.67	24.227		
Lack-of-Fit	3	10.19	0.48%	10.19	3.398	0.14	0.939
Pure Error	75	1879.48	89.22%	1879.48	25.060		
Total	80	2106.58	100.00%				

Table 8.15, ANOVA Results from an HGLM for Cnemic Index by Religion.

Scatter plots show that 'pagans' have a more narrow and higher range of tibial size than 'Christians' (Fgs 8.34 and 8.35).

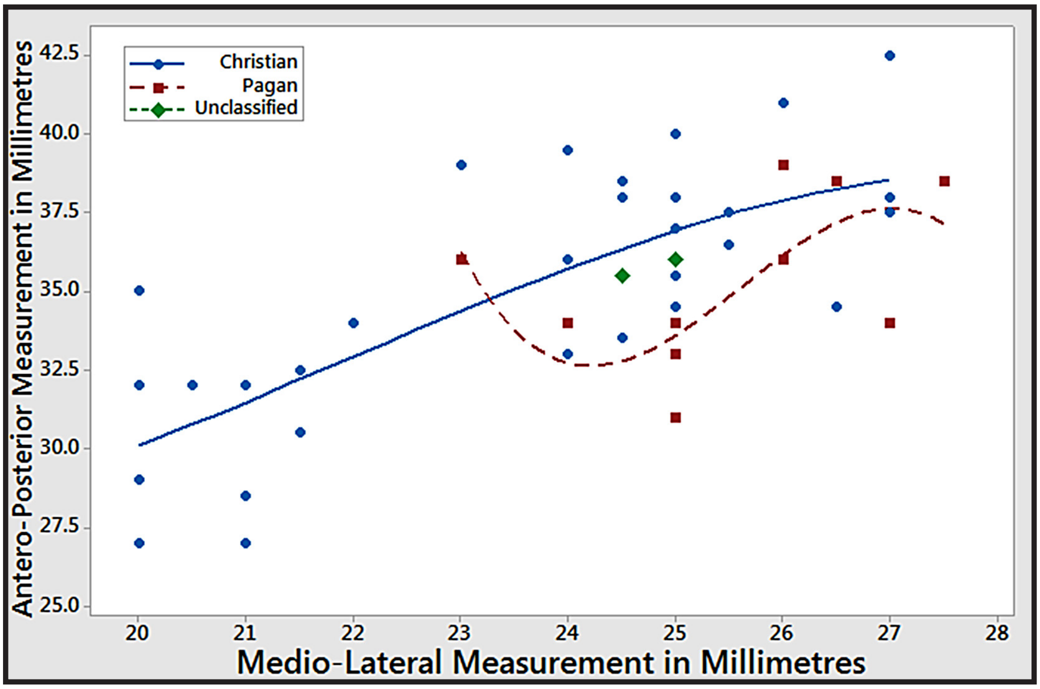

Figure 8.34, Scatter Plot of Cnemic Index by Religion for Males. Cube Slope (best fit) Given.

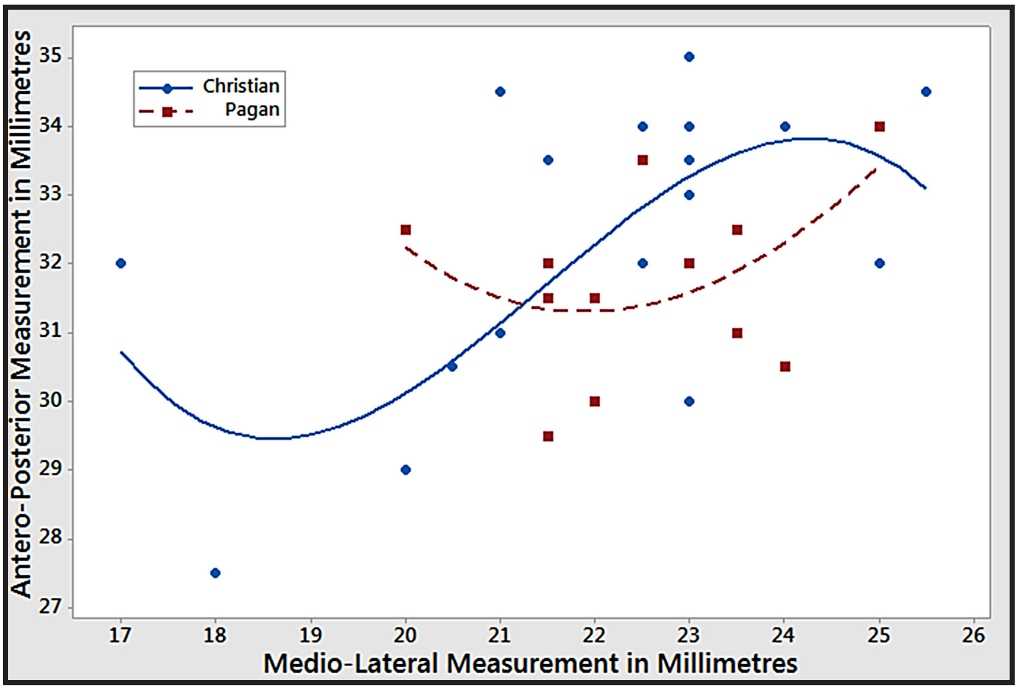

Figure 8.35, Scatter Plot of Cnemic Index by Religion for Females. Cube Slope (best fit) Given.

Comparing indices by ethnic grouping shows that 'Norse' females have a more narrow and higher range of tibial size than the 'native' (Fg 8.36), while males seem relatively equivalent between the ethnic groups (Fg 8.37). HGLM also indicates ethnicity is a key separator of groups (Table 8.16).

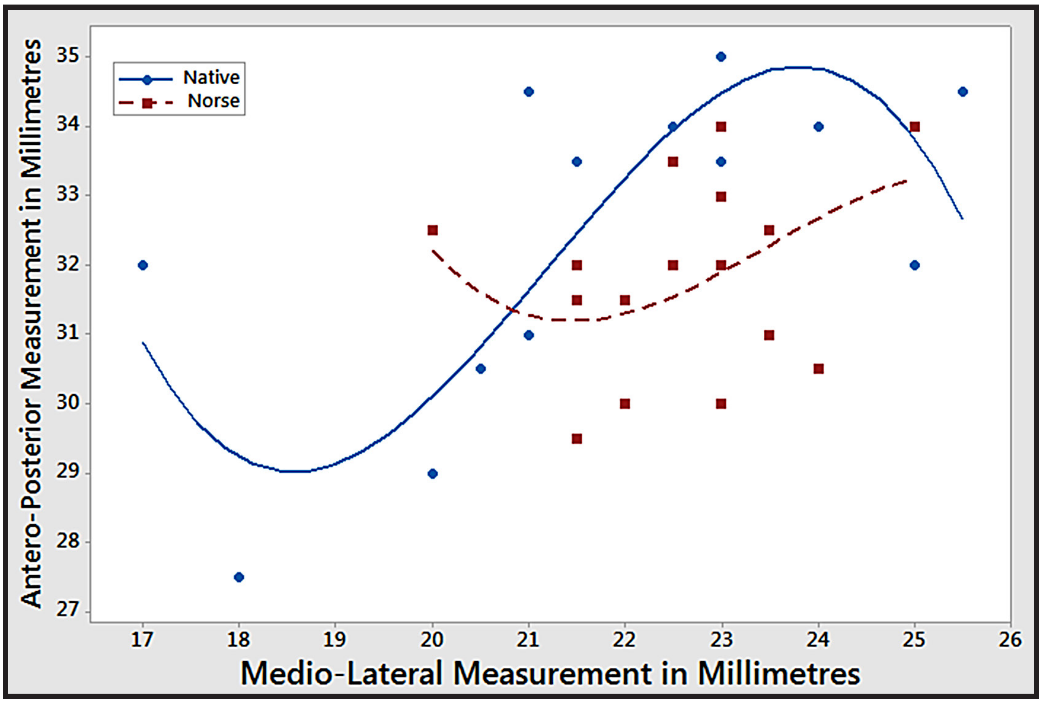

Figure 8.36, Scatter Plot, Cnemic Index by Ethnicity for Females. Cubed Slope (best fit) Given.

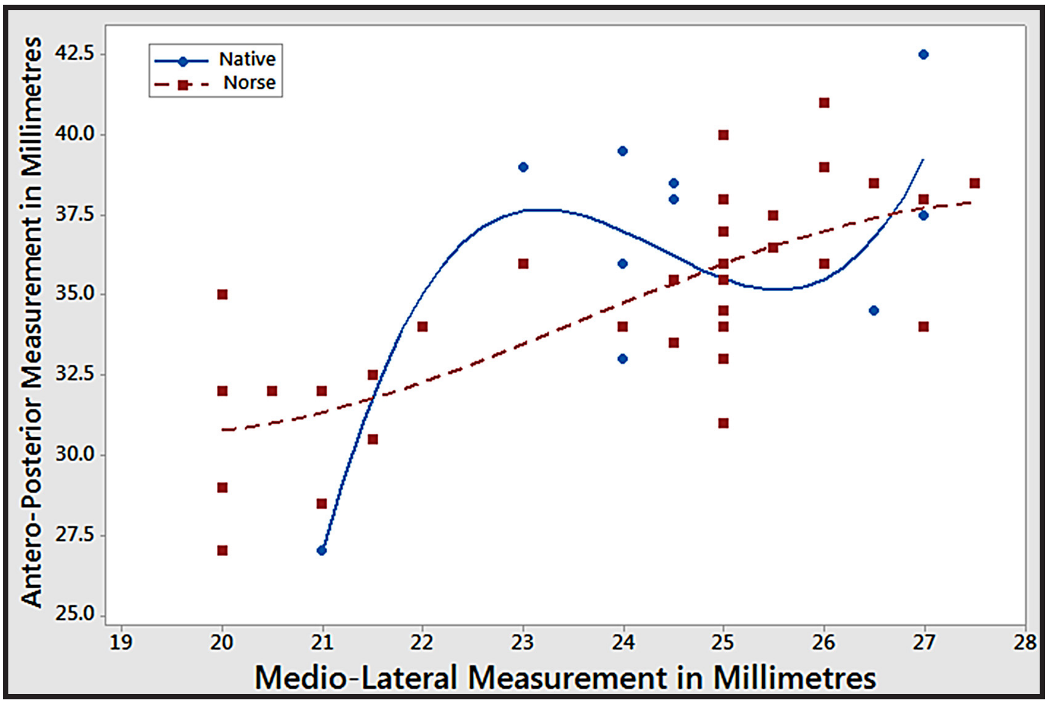

Figure 8.37, Scatter Plot, Cnemic Index by Ethnicity for Males. Cubed Slope (best fit) Given.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Ethnicity	1	97.90	4.65%	97.90	97.90	3.85	0.053
Error	79	2008.68	95.35%	2008.68	25.43		
Lack-of-Fit	2	56.53	2.68%	56.53	28.26	1.11	0.333
Pure Error	77	1952.15	92.67%	1952.15	25.35		
Total	80	2106.58	100.00%				

Table 8.16, ANOVA Results from an HGLM for Cnemic Index by Ethnicity.

HGLM indicates that site type is the primary discriminator between the groups (Table 8.17). Scatter plots show that individuals in the small cluster group have the highest indices and narrowest range (Fgs 8.38 and 8.39).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Type	4	269.87	12.81%	269.87	67.467	2.79	0.032
Error	76	1836.71	87.19%	1836.71	24.167		
Lack-of-Fit	4	39.28	1.86%	39.28	9.821	0.39	0.813
Pure Error	72	1797.43	85.32%	1797.43	24.964		
Total	80	2106.58	100.00%				

Table 8.17, ANOVA Results from an HGLM for Cnemic Index by Site Type.

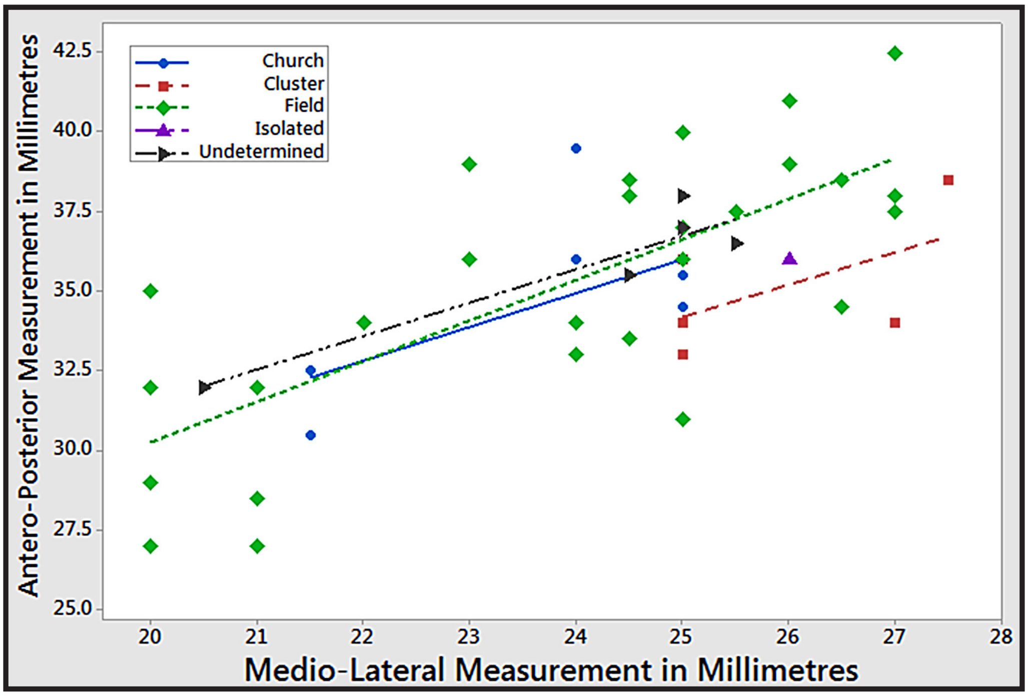

Figure 8.38, Scatter Plot of Cnemic Index by Site Type for Males. Linear Slope (best fit) Given.

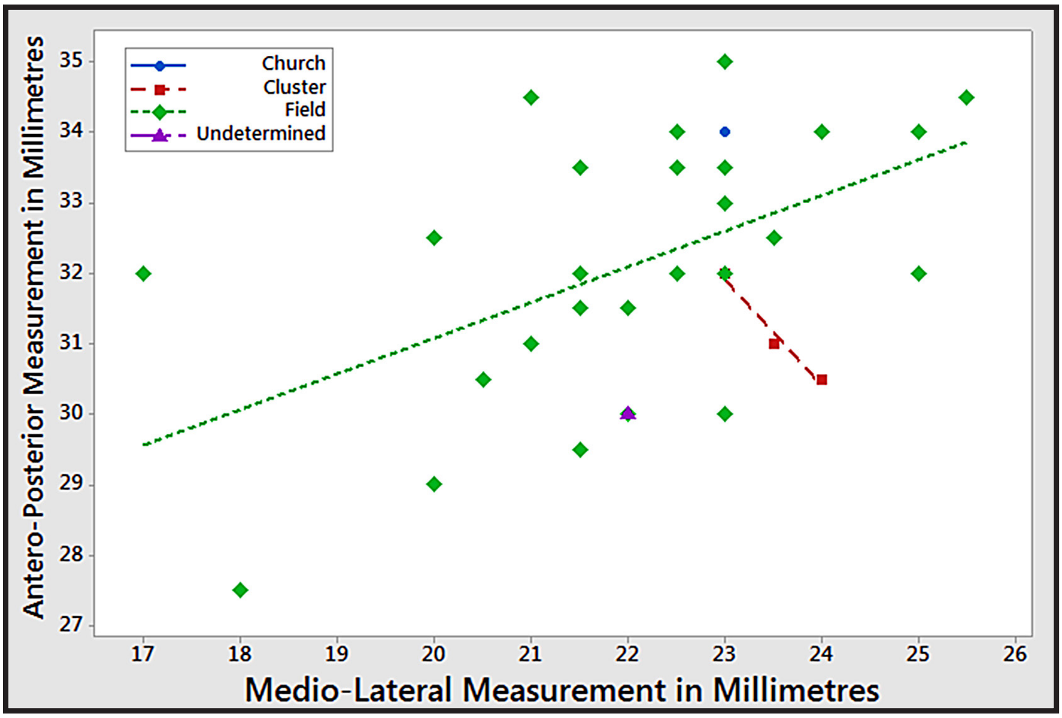

Figure 8.39, Scatter Plot of Cnemic Index by Site Type for Females. Linear Slope (best fit) Given.

8.6.5 Discussion of the Results of Limb Proportion Analysis

Analyses above do show a separation between many of the groups studied. Between the religious groups, scatter plots show a division between pagan- and Christianised populations, and religion was shown to be an important step in the separation of these groups in all but the crural index. ‘Pagans’ had a higher brachial index than ‘Christians’. No appreciable difference was seen in the crural index.

Allen’s rule essentially states that organisms in colder climates will have lower brachial and crural indices (Cowgill *et al* 2012, Holliday 1999). As the two religious groups occupied the same general climate over the course of the study period, a higher index for either group is not to be expected. In addition, Allen’s rule should, theoretically, produce a pattern in which *both* the brachial and crural indices generally agree: both low or both high across a population. However, this is again not the case between the ‘pagan’ and ‘Christian’ groups in this study; the brachial indices are higher for ‘pagans’ and yet there is no difference in the crural.

As religious beliefs do often predicate clothing, one potential explanation for this variation may be as simple as dress (Gilligan *et al* 2013, Mäkinen 2007, Newburgh 1968). It is possible that the clothing styles for the ‘Christian’ population did not afford as much thermal protection in the arms as for the legs; or alternatively that the ‘pagan’ styles are warmer in the arms than those of the ‘Christians’. If this were particularly so over the period of skeletal growth, this would theoretically cause Allen’s rule to effect the arms and not the legs. This is, of course, only one potential explanation and has yet to be thoroughly tested (Steegman 2007).

‘Christians’ had a broad range of femoral and tibial shaft sizes, when compared to ‘pagans’. Due to this, both the ‘pagan’ and unclassified meric indices for males fall within the ‘Christian’ scatter; however, the ‘pagan’ males fall in the higher, and thus rounder, index range; and the unclassified indices fall on the flatter side of the range. A similar pattern is seen in the tibiae with the ‘pagan’ cnemic indices falling within the ‘Christian’. In this case, however, both the male and female pagan indices are on the narrower side of the plot.

In terms of diaphyseal shape, the femur of the ‘pagans’ is on the higher end of the meric index while the tibia is narrow medio-laterally. The Christianised group, however, is much more varied in both diaphyseal shapes. As there are many factors which contribute to lower limb shape, it is currently unclear which factors (or combination thereof) are the driving force behind the clustering of the pagan group and the variety seen in the Christian. Lower meric indices (flatter femora medio-laterally) resist greater impact stress on the femoral head and greater abduction forces, such as those induced during climbing (Ruff *et al* 1984, Ruff and Hayes 1983). Thus, individuals from rougher terrains tend towards platymeria. Lower cnemic indices have been linked to runners (Shaw and Stock 2009). They have also been linked to rough and steep terrains (Ruff 1987). As both groups reside in essentially the same geographic areas, this could indicate that the pagan group was more prone to undertake certain activities, like hill walking for instance, while the ‘Christian’ group was more varied in the type of activities chosen. There is, however, not enough information to make a more definitive suggestion of aetiology at this time.

Results from limb proportions test separated by ethnicity show that there is no statistical difference for either the crural or brachial indices. For the meric index, it is sex which is the major factor in the division of groups, which is theoretically to be expected considering that females tend to have a broader pelvis (Ruff 1987). It is the cnemic index in which ethnicity is a factor in group separation, with the ‘Norse’ having a higher mean index than the native (69.90 vs 67.57 respectively). This suggests different mobility patterns between the groups, with the ‘Norse’ potentially having a more varied pattern of directionality.

A similar pattern is seen with the site type analyses. There is no significant difference between groups in the brachial or crural indices. Sex is the important factor in group separation for the meric index, and site type is the significant factor in group separation for the cnemic index; however, the number of indices available for the church, undetermined and small cluster sites is low (8, 6, and 8 respectively—with only one for the isolated sites. Therefore, results should be taken with caution until more data is available.

Limb proportion studies have waxed and waned in popularity throughout the years. This has resulted in an incomplete understanding of the aetiology of the variation seen across the human record. A main purpose of this PhD research is to assess the viability of commonly accepted population groupings in early mediaeval Scotland. While the reason for variation may be unclear, results here suggest intra-group affinity and some intergroup separation.

Although the ‘why’ behind the separation may remain uncertain, what could be important at this stage of the research is that a difference *is* being detected.

8.7 Joint Changes, Degeneration, and Disease

Traditional palaeopathological studies have placed most joint changes in the category of disease and degeneration (Weiss and Jurmain 2007, White *et al* 2012: 441-43). However, it is increasingly evident that the line between healthy ‘adaptive’ joint changes and pathological ones is very uncertain indeed (Menkes and Lane 2004, Rogers and Waldron 1995, van der Kraan and van den Berg 2007, and Weiss and Jurmain 2007). Bone is a living tissue that transforms as a result of the environment in which it exists (Pearson and Lieberman 2004, Ruff *et al* 2006). The environment of a joint will vary depending on the type of joint; level of usage; and the health, disease and genetics of the organism wherein the joint resides. Thus, the way a joint changes (or does not change) will vary by circumstance. Therefore, caution is advised in analyses of joint changes, especially those based on qualitative examinations of severity (Villotte and Knüsel 2013, Weiss and Jurmain 2007).

Most forms of joint degeneration are primarily evident in the soft tissue. It is osteoarthritis which is generally recognisable to the palaeopathologist. Per Waldron (2009: 33-4): ‘Osteoarthritis can be said to be present if eburnation can be demonstrated, or as least two of the following exist: marginal osteophyte, new bone on the joint surface, pitting on the joint surface or an alteration in the joint contour.’ This criteria was used to determine the presence or absence of osteoarthritis in the joints analysed.

8.7.1 Vertebral Degeneration

Changes to the vertebrae were recorded according to the details in Section 5.3.6 for adolescents and all adults. This included recording the apophyseal and corpus surfaces separately. As noted, there is no concrete understanding of the aetiology of vertebral degeneration, and little is understood of the cause(s) for breakdown in the apophyseal joints vs vertebral bodies (Eubanks *et al* 2007, Fujiwara *et al* 1999). In addition, the fragmented assemblage made robust statistical analysis infeasible. Information for each vertebra was therefore combined. For example, a vertebra with osteophytes on either body or facets was recorded as osteophytes present. Waldron's criteria was used to determine degeneration for the vertebra as a whole.

Degenerative changes tend to correlate with age. Thus, the increase in degeneration from young to old age groups is not unexpected (Fgs 8.40 to 8.42). A chi[2] test confirms this as statistically significant: $p=0.001$, $X^2=1659.355$, $df=120$. Tables 8.18-20 list the number of vertebrae analysed.

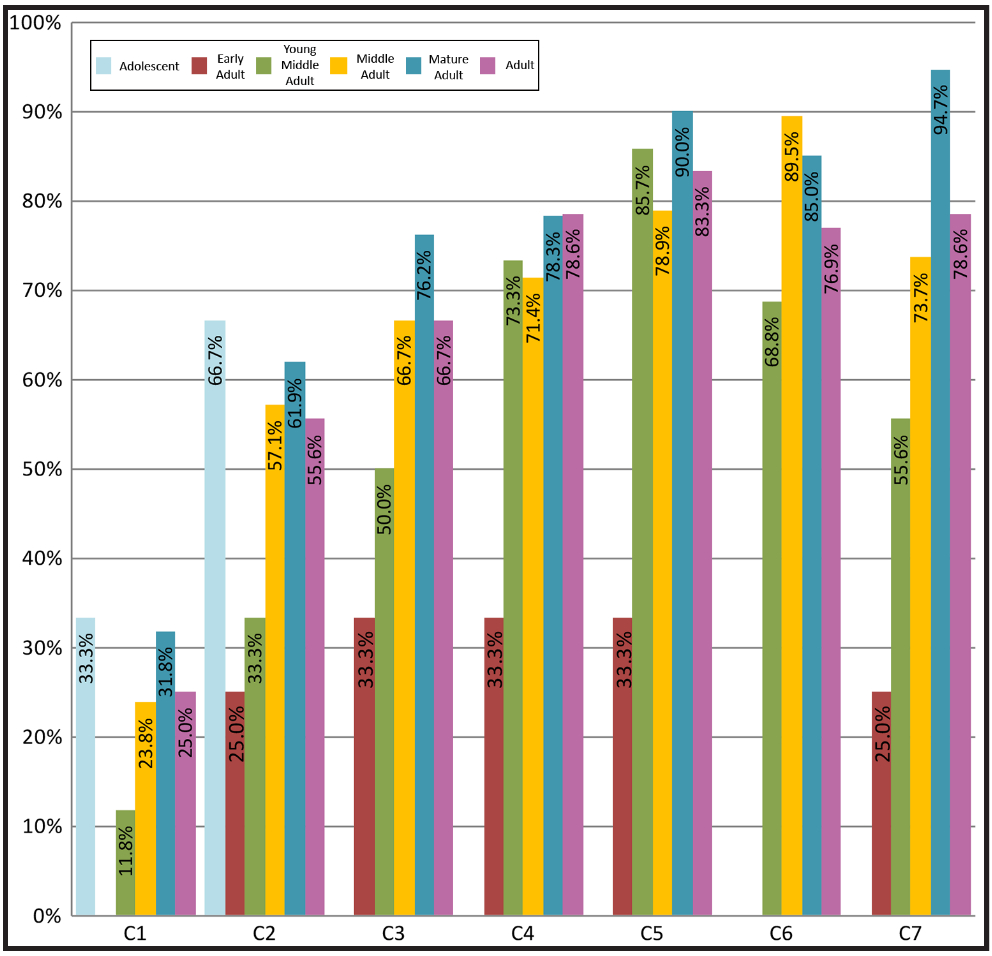

Figure 8.40, Histogram of Degeneration Prevalence in the Cervical Vertebrae by Age Group.

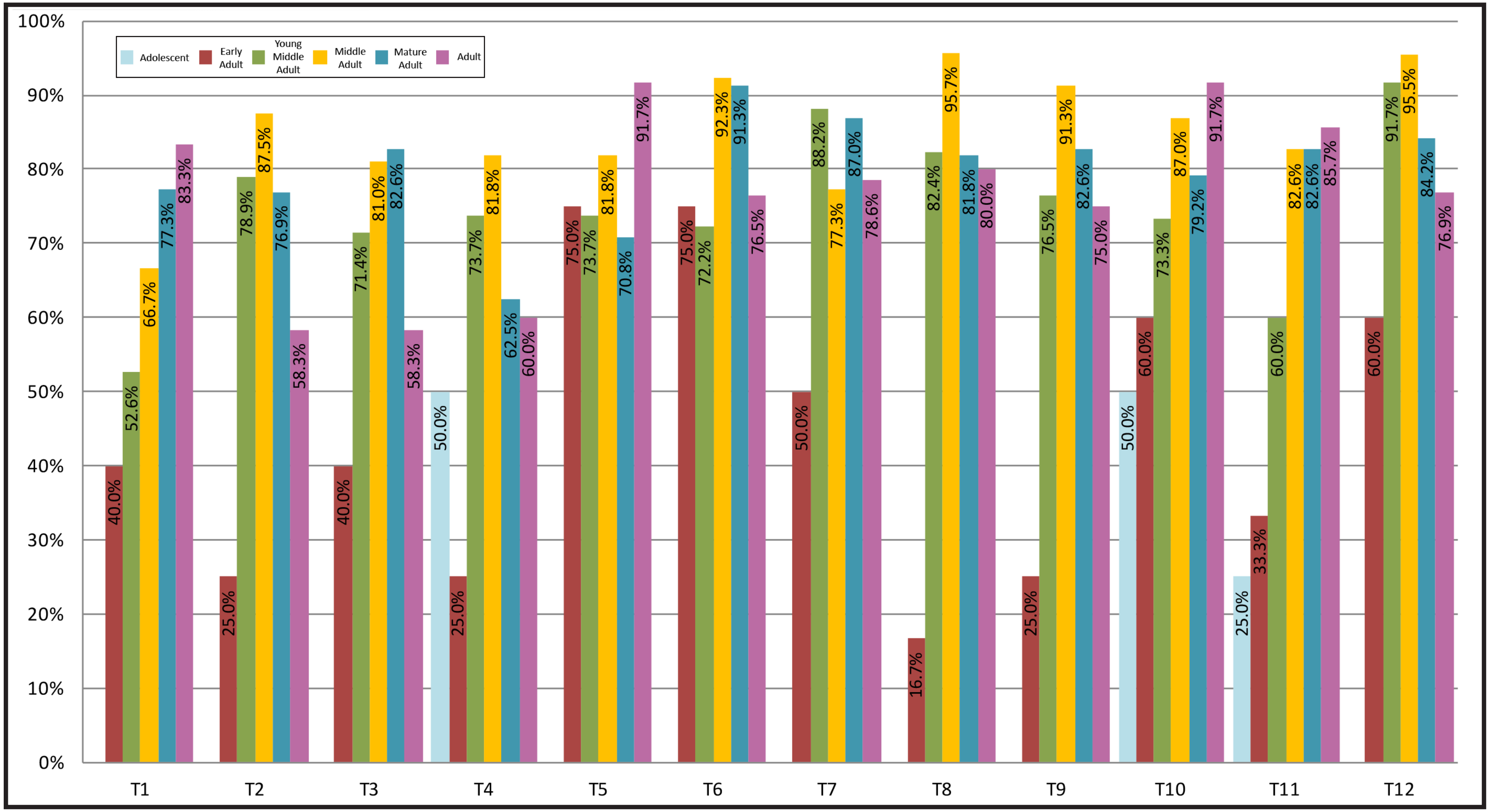

Figure 8.41, Histogram of Degeneration Prevalence in the Thoracic Vertebrae by Age Group.

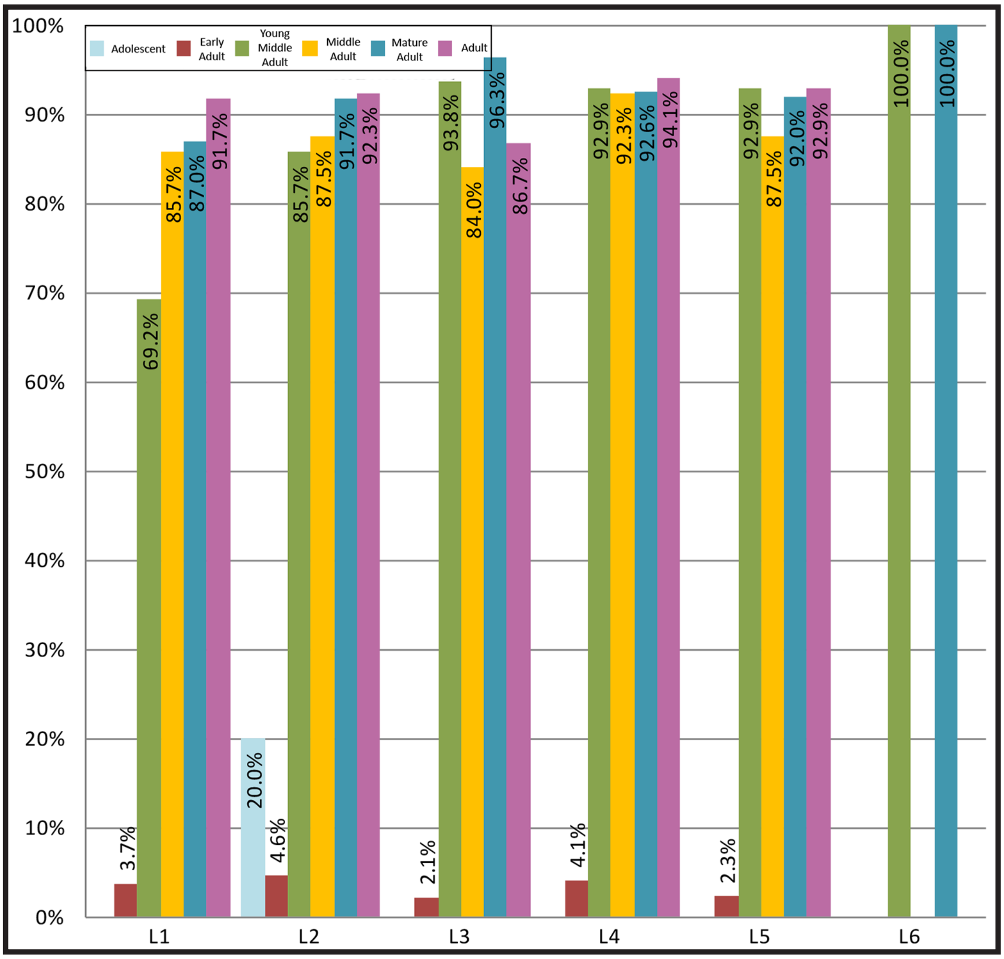

Figure 8.42, Histogram of Degeneration Prevalence in the Lumbar Vertebrae by Age Group.

Age	C1	C2	C3	C4	C5	C6	C7
Adolescent	3	3	2	2	3	2	3
Early Adult	2	4	3	3	3	3	4
Young Middle Adult	17	15	16	15	14	16	18
Middle Adult	21	21	21	21	19	19	19
Mature Adult	22	21	21	23	20	20	19
Adult	12	18	18	14	12	13	14

Table 8.18, Number of Cervical Vertebrae Analysed for each Age Group.

Age	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Adolescent	2	2	3	2	2	2	1	1	4	2	4	1
Early Adult	5	4	5	4	4	4	4	6	4	5	3	5
Young Middle Adult	19	19	21	19	19	18	17	17	17	15	16	12
Middle Adult	24	24	21	22	22	26	22	23	23	23	23	22
Mature Adult	22	26	23	24	24	23	23	22	23	24	23	19
Adult	12	12	12	10	12	17	11	15	12	12	14	13

Table 8.19, Number of Thoracic Vertebrae Analysed for each Age Group.

Age	L1	L2	L3	L4	L5	L6
Adolescent	5	5	5	5	4	1
Early Adult	7	6	6	8	6	0
Young Middle Adult	13	14	16	14	14	2
Middle Adult	21	24	25	26	24	0
Mature Adult	23	24	27	27	25	1
Adult	12	13	15	17	14	0

Table 8.20, Number of Lumbar Vertebrae Analysed for each Age Group.

Figure 8.43 compares vertebral degeneration between the sexes. A chi^2 test indicates no statistical difference ($p=0.915$, $X^2=16.009$, $df=25$).

An HGLM performed on religious groups reveals neither religion nor sex are significant factors in group separation (Fg 8.44).[3] Dividing the population into age groups as well as religious groups produced numbers too small for HGLM analysis and therefore age was not included as a factor. A chi^2 test (Section 8.2) suggests that the 'pagan' and 'Christian' do have a significantly different age structure. This may bias the HGLM results; however, on its face, the vertebral degeneration of the two populations are comparable as a whole.

When separating the population into ethnic groups (Fg 8.45), both ethnicity and sex are important factors in the separation of groups, with sex having a significant Analysis of Variance (ANOVA) result (Table 8.21). As with religion, dividing the population into age groups produced numbers too small for HGLM, thus age was not included as a potential factor. A chi^2 test (Section

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Ethnicity	1	0.1352	2.51%	0.1352	0.13519	2.79	0.098
Sex	1	0.5380	10.00%	0.5380	0.53802	11.09	0.001
Error	97	4.7047	87.48%	4.7047	0.04850		
Lack-of-Fit	1	0.2395	4.45%	0.2395	0.23950	5.15	0.025
Pure Error	96	4.4652	83.03%	4.4652	0.04651		
Total	99	5.3779	100.00%				

Table 8.21, ANOVA Results from an HGLM for Vertebral Degeneration by Ethnicity.

3 See Table 8.22 for number of vertebrae analysed.

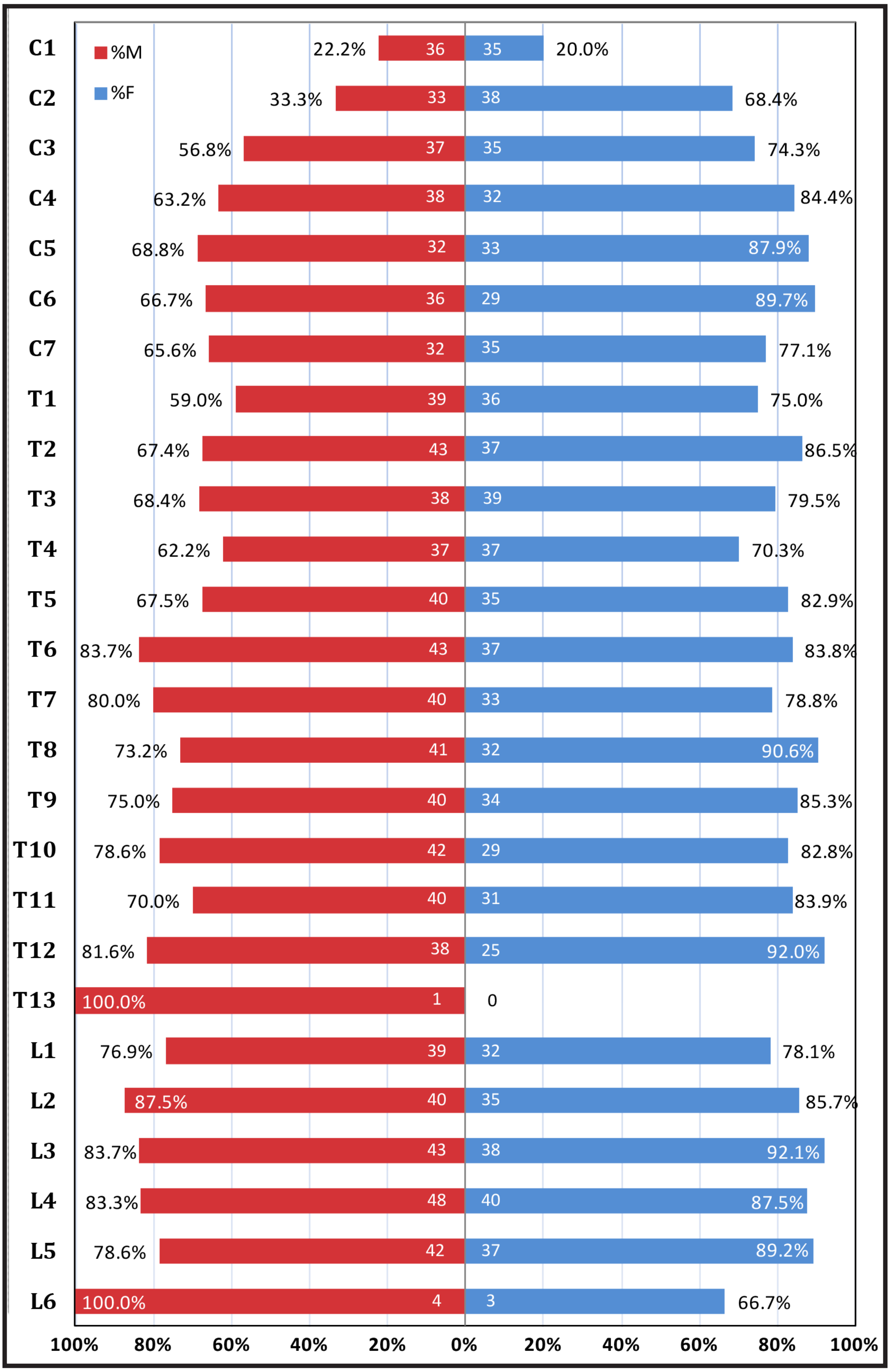

Figure 8.43, Histogram of Vertebral Degeneration Prevalence by Sex. Number of Vertebrae Given along Centre Axis.

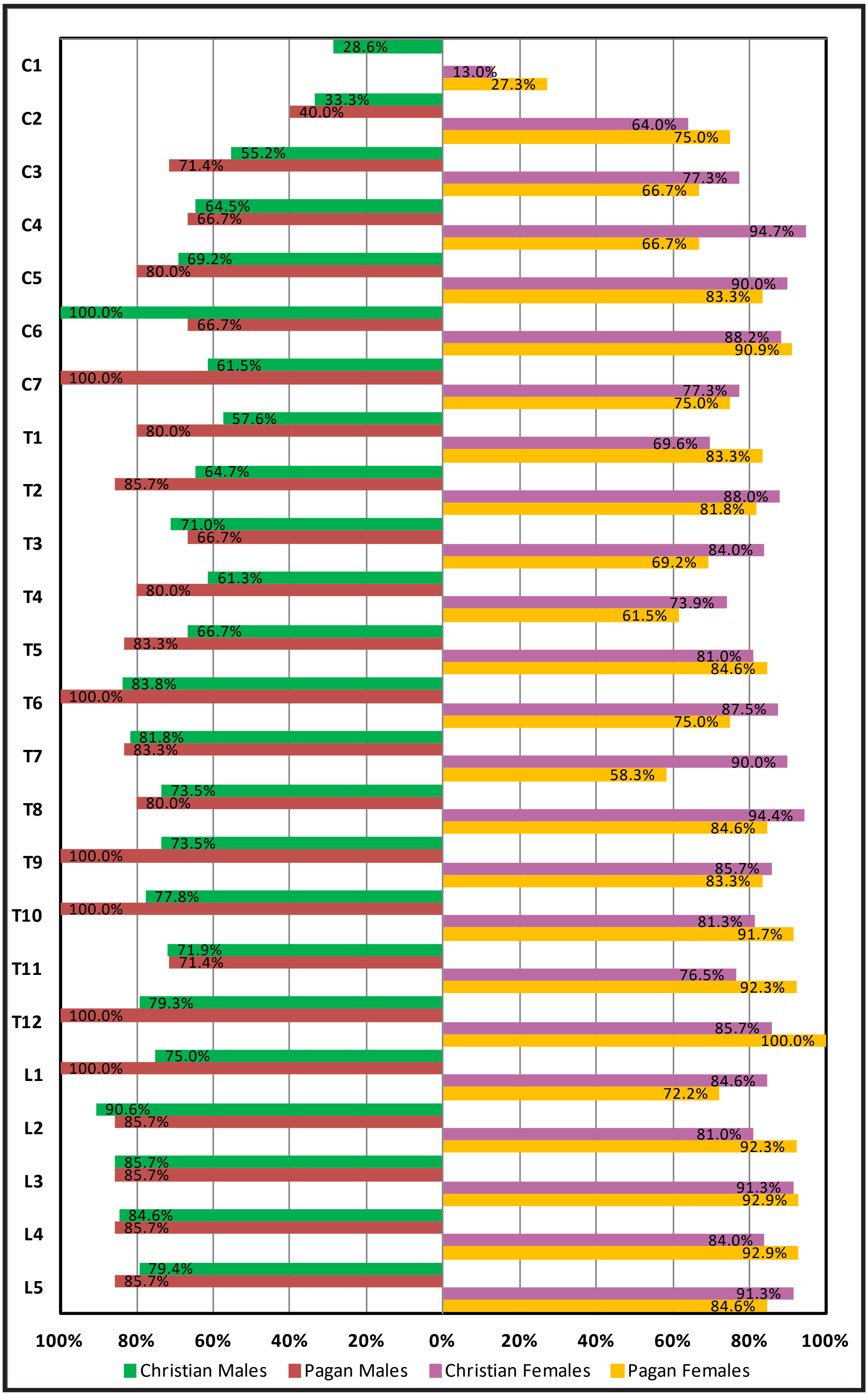

Figure 8.44, Histogram of Vertebral Degeneration Prevalence by Religious Group.

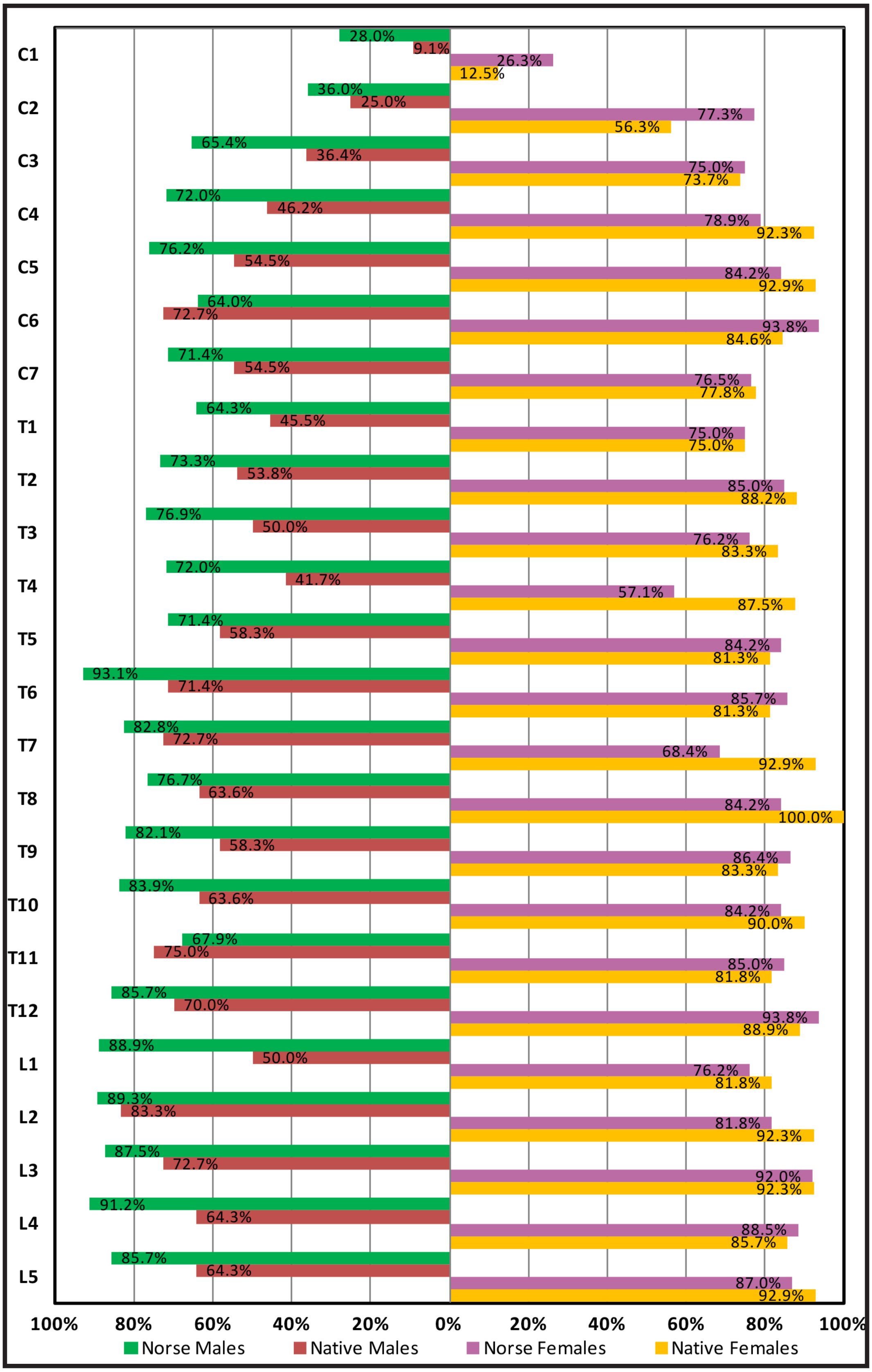

Figure 8.45, Histogram of Vertebral Degeneration Prevalence by Ethnic Groups.

Vert	Norse		Native		Christian		Pagan		Church		Field		Cluster	Unclass
	M	F	M	F	M	F	M	F	M	F	M	F		
C1	25	19	11	16	25	19	11	16	5	2	28	31	2	4
C2	25	22	8	16	25	22	8	16	4	3	26	34	2	3
C3	26	16	11	19	26	16	11	19	5	2	29	32	2	3
C4	25	19	13	13	25	19	13	13	6	3	28	27	2	4
C5	21	19	11	14	21	19	11	14	5	1	24	30	2	4
C6	25	16	11	13	25	16	11	13	5	1	28	27	2	3
C7	21	17	11	18	21	17	11	18	4	2	21	19	2	3
T1	28	20	11	16	28	20	11	16	6	2	30	32	2	4
T2	30	20	13	17	30	20	13	17	8	2	29	32	3	6
T3	26	21	12	18	26	21	12	18	7	3	28	34	2	4
T4	25	21	12	16	25	21	12	16	7	3	27	32	2	4
T5	28	19	12	16	28	19	12	16	7	3	30	30	2	4
T6	29	21	14	16	29	21	14	16	8	3	32	31	1	7
T7	29	19	11	14	29	19	11	14	7	2	28	29	3	5
T8	30	19	11	13	30	19	11	13	6	2	31	29	2	3
T9	28	22	12	12	28	22	12	12	7	2	29	30	2	5
T10	31	19	11	10	31	19	11	10	8	2	30	26	2	5
T11	28	20	12	11	28	20	12	11	5	2	31	27	2	5
T12	28	16	10	9	28	16	10	9	6	2	28	21	2	5
L1	27	21	12	11	27	21	12	11	7	1	27	29	2	5
L2	28	22	12	13	28	22	12	13	8	1	16	33	2	4
L3	32	25	11	13	32	25	11	13	8	1	29	35	2	6
L4	34	26	14	14	34	26	14	14	8	2	33	35	2	6
L5	28	23	14	14	28	23	14	14	6	2	31	34	2	4

Table 8.22, Number of Vertebrae Analysed for each Group by Vertebral Type.

8.2) indicates that 'native' and 'Norse' have a statistically significant difference in age structure. This may suggest a bias in the HGLM testing; however, this could further imply heterogeneity between the two 'ethnic' populations.

This same test performed by site type (Table 8.23, Fg 8.46) reveals that

Factor coding -1, 0, +1		Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15					
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	0.09848	4.78%	0.09848	0.09848	3.26	0.067
Error	69	1.96230	95.22%	1.96230	0.02844		
Lack-of-Fit	1	0.05432	2.64%	0.05432	0.05432	1.94	0.169
Pure Error	68	1.90798	92.59%	1.90798	0.02806		
Total	70	2.06078	100.00%				

Table 8.23, ANOVA Results from an HGLM for Vertebral Degeneration by Site Type.

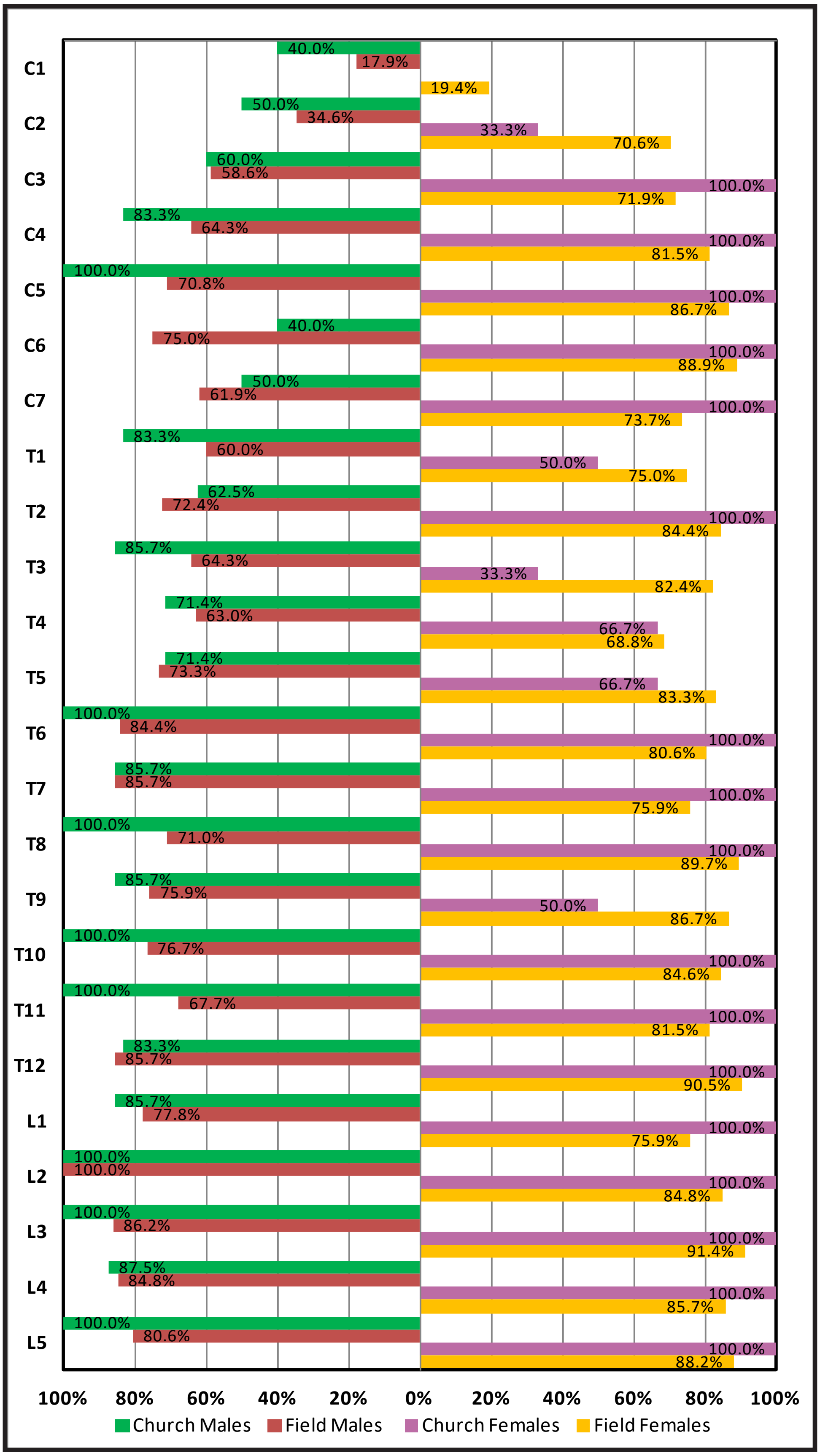

Figure 8.46, Histogram of Vertebral Degeneration Prevalence by Site Type.

sex is the important factor in separation. This should be taken with some caution as the number of vertebrae in the Church group was low (Table 8.22). In addition, the remaining site types yielded numbers too small to include in the analysis: Unclassified (largest N=6), Isolated (largest N=1) and Cluster (largest N=3). However, what is suggested by this result is that the group divisions are not important in the variation of vertebral degeneration.

8.7.2 Elbow Osteoarthritis

Joint changes for the elbow were recorded according to the methodology in Section 5.3.7. Due to fragmentation, the four joint surfaces in the elbow were combined to gain the most information possible. Analysis of sidedness was not realistic and therefore not attempted. The trochlea, capitulum, radial head and lunar notch were assessed for porosity, osteophytosis, and eburnation. If any surface illustrated porosity and osteophytosis and/or eburnation, osteoarthritis was recorded as present for that individual.

Figure 8.46 illustrates a not unexpected increase in osteoarthritis by age. A chi^2 test confirms this is statistically significant: p=0.001, X^2=39.806, df=4.

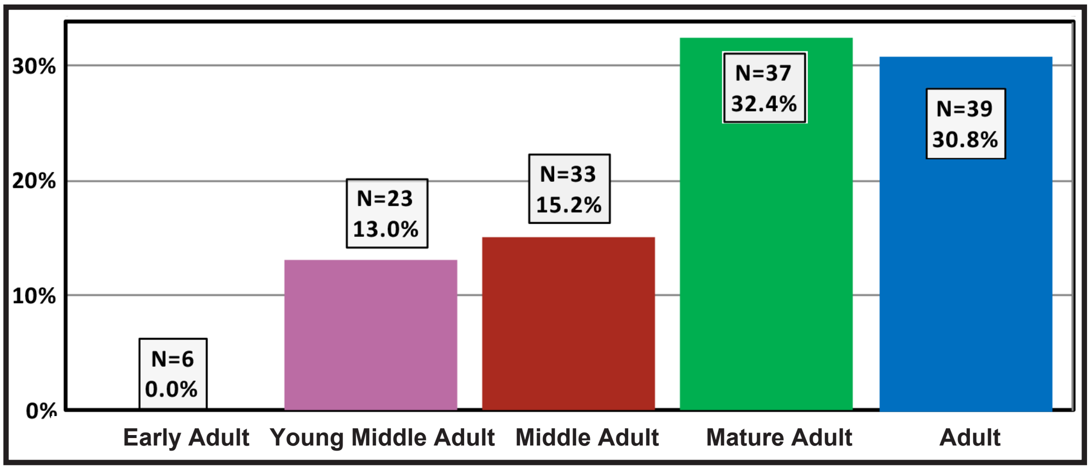

Figure 8.47, Histogram of Osteoarthritis Prevalence in the Elbow by Age Group.

Chi^2 test results also show a significant difference in osteoarthritis prevalence between males and females: p=0.005, X^2=8.035, df=1 (Fg 8.47).

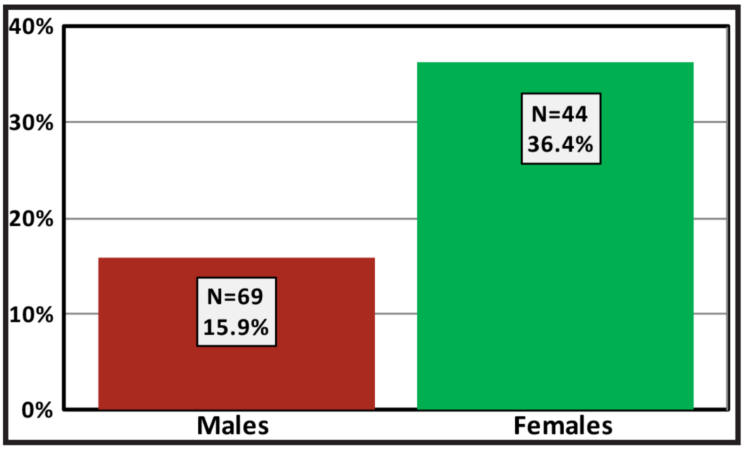

Figure 8.48, Histogram of Osteoarthritis Prevalence in the Elbow by Sex.

HGLM tests reveal that it is sex and then age which are important factors in analyses of religious, ethnic and site type groups (Tables 8.24 to 8.26). No difference was discovered between these groups themselves.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	1.120	5.45%	1.084	1.0837	6.43	0.013
Age	4	1.388	6.75%	1.388	0.3469	2.06	0.092
Error	107	18.041	87.79%	18.041	0.1686		
Lack-of-Fit	14	2.208	10.75%	2.208	0.1577	0.93	0.534
Pure Error	93	15.832	77.05%	15.832	0.1702		
Total	112	20.549	100.00%				

Table 8.24, ANOVA Results from an HGLM for Elbow Osteoarthritis by Religion.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	1.120	5.45%	1.084	1.0837	6.43	0.013
Age	4	1.388	6.75%	1.388	0.3469	2.06	0.092
Error	107	18.041	87.79%	18.041	0.1686		
Lack-of-Fit	12	1.853	9.02%	1.853	0.1544	0.91	0.544
Pure Error	95	16.187	78.78%	16.187	0.1704		
Total	112	20.549	100.00%				

Table 8.25, ANOVA Results from an HGLM for Elbow Osteoarthritis by Ethnicity.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	1.120	5.45%	1.084	1.0837	6.43	0.013
Age	4	1.388	6.75%	1.388	0.3469	2.06	0.092
Error	107	18.041	87.79%	18.041	0.1686		
Lack-of-Fit	17	3.219	15.66%	3.219	0.1893	1.15	0.322
Pure Error	90	14.822	72.13%	14.822	0.1647		
Total	112	20.549	100.00%				

Table 8.26, ANOVA Results from an HGLM for Elbow Osteoarthritis by Site Type.

Graphs of the different groups do show a difference between males in the religious and ethnic categories (Fgs 8.49 and 8.50). Chi^2 test results reveal that it is the ethnic groups which produce a statistically significant result: $p=0.138$, $X^2=2.201$, df=1 (Religion); $p=0.011$, $X^2=6.526$, df=1 (Ethnicity). Chi^2 test results also reveal that there is a significant difference between the site types: $p=0.001$, $X^2=34.456$, df=4 (Fg 8.51). Again, the age structures of these groups are statistically different (Section 8.2), suggesting potential bias in the chi^2 tests, yet also indicating a basic difference between the groups (in the form of age).

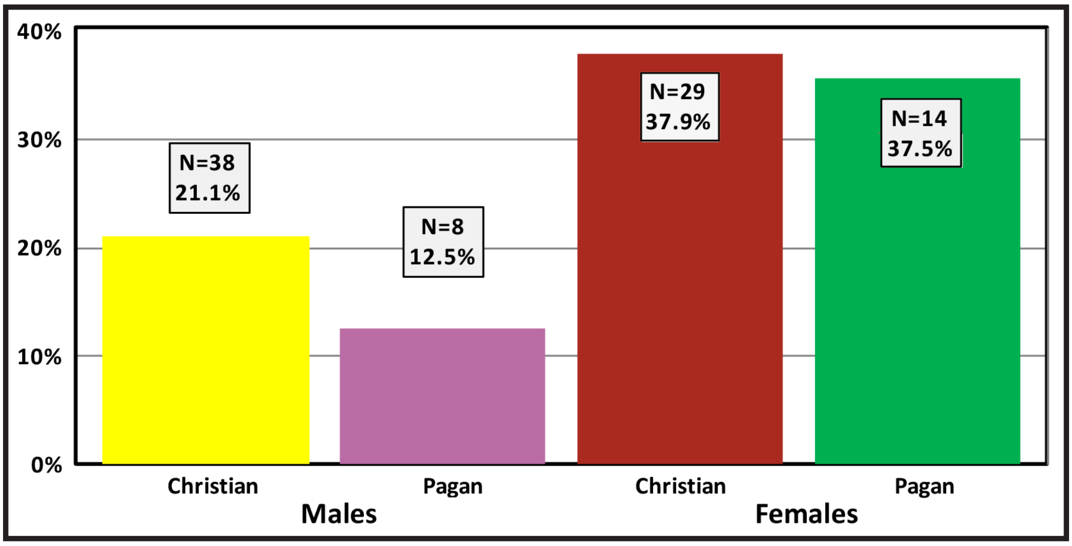

Figure 8.49, Histogram of Osteoarthritis Prevalence in the Elbow by Religion.

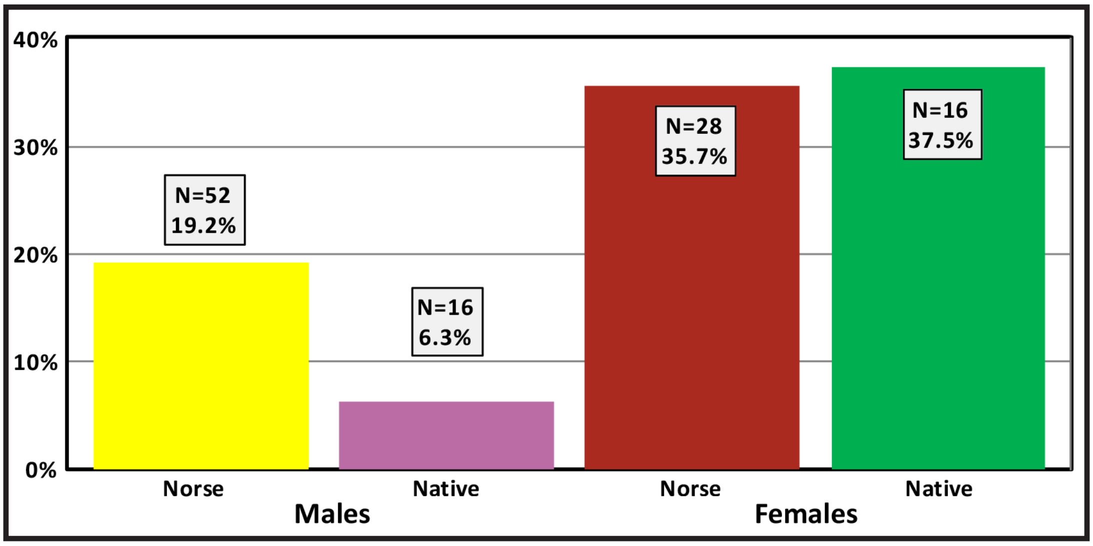

Figure 8.50, Histogram of Osteoarthritis Prevalence in the Elbow by Ethnicity.

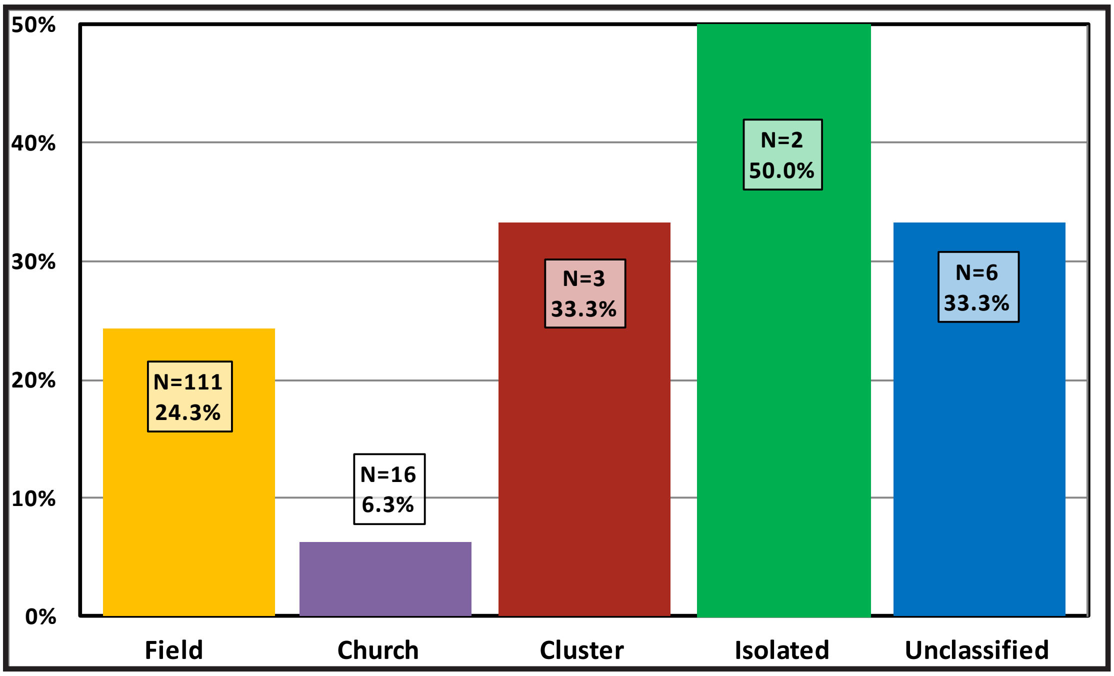

Figure 8.51, Histogram of Osteoarthritis Prevalence in the Elbow by Site Type.

Modern, Western populations show a relatively low prevalence in elbow osteoarthritis: 7% reported by Doherty and Preston (1989); and it is considered a male condition, rather than a female one. For example, Stanley (1994: 386) reports that '[i]n women older than 40 years the prevalence of the condition was 1.3%, whereas in men of a similar age it was 6%'. At the 18-19th century site of Christ Church, Spitalfields in east London, (Waldron 1991) only seven males and two females showed signs of elbow osteoarthritis (out of a total 360 males and 346 females). This is quite different than the prevalence rates from this early mediaeval Scottish population: 15.9% for males and 36.4% for females. Not only are these prevalence rates many times more than the (early-)modern, it is the females who have the highest rate.

Going back in time does appear to raise the prevalence rate of elbow OA At the Notre-Dame du Bourg necropolis in Digne, France, the 16-17th century population shows rates of 43.4% for males and 19.8% for females (Debono *et al* 2004: 398). These rates are much higher and are, in fact, more than those of the early mediaeval Scottish population; however, the males are still the primary candidates for elbow OA. At this same cemetery, Notre-Dame du Bourg, in the 11-13th century layers, the prevalence of elbow OA was 25% for males and 20% for females. This again places the males as more likely to show signs of elbow OA than females; although, by not as much as later cemetery layer, nor the modern populations.

These comparisons are not necessarily commensurate in time, geography, and (conceivably) population ancestry to the research population. However, they do suggest that further investigation into the aetiology of the elbow osteoarthritis in early mediaeval Scotland may be warranted.

8.7.3 Shoulder Osteoarthritis

Joint changes for the shoulder were recorded according to the methodology given in Section 5.3.7. As with the vertebrae and elbow, information from all the joint surfaces, the humeral head and glenoid fossa, were combined to gain the most information possible to use in the analyses. The surface of both features was assessed for porosity, osteophytosis, and eburnation. If a surface exhibited porosity and osteophytosis and/or eburnation, osteoarthritis was recorded as present for that individual.

Sidedness was again not practicable and thus excluded from the analysis.

Figure 8.52 illustrates the different prevalence rates of shoulder osteoarthritis by age group. A chi^2 test reveals that the rates of osteoarthritis by age group are statistically significant: $p=0.035$, $X^2=10.312$, $df=4$.

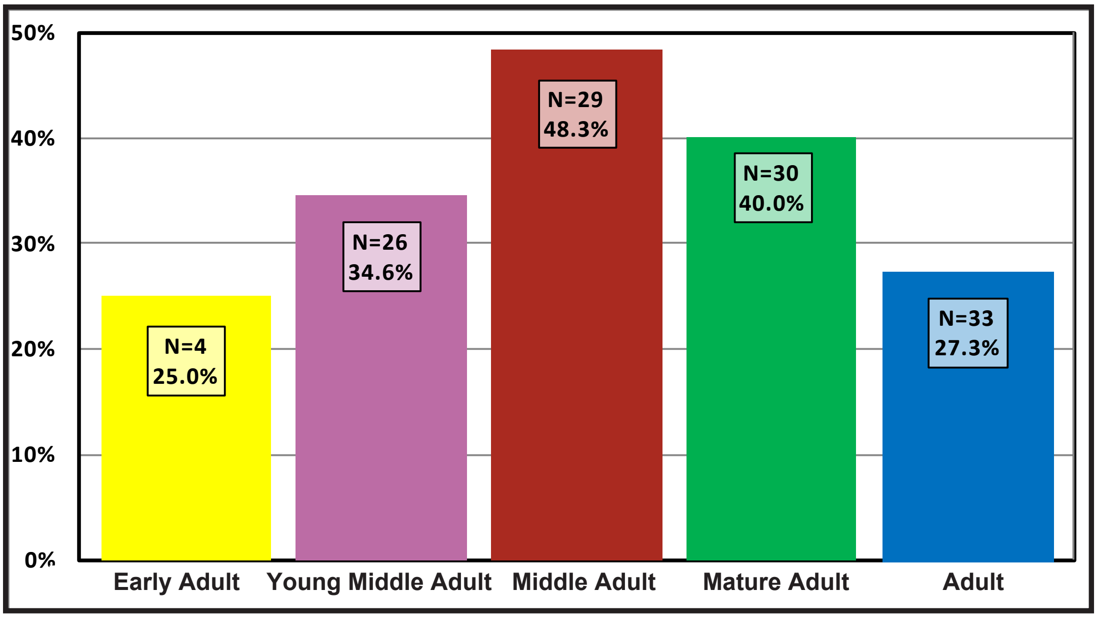

Figure 8.52, Histogram of Osteoarthritis Prevalence in the Shoulder by Age Group.

In this case the highest prevalence rate is in the middle adult group and not in the oldest group, mature adults. The dip in prevalence seen in the mature age group could be attributed to the unknowns in the 'catch-all' adult group; however, this could also be an indicator of less activity occurring in older age, allowing for healing. Granted, healing would be generally be attenuated as age debilitates the reparative functions in the body; making such an argument tenuous. This upsurge in the middle adult group could also be a bi-product of a hard life which lead to an early (or earlier) death. A more accurate age at death would have to be determined for the adult age group to further understand this inconsistency.

Figure 8.53 shows little difference in shoulder osteoarthritis prevalence between males and females and chi^2 test results confirm this: $p=0.734$, $X^2=0.115$, $df=1$.

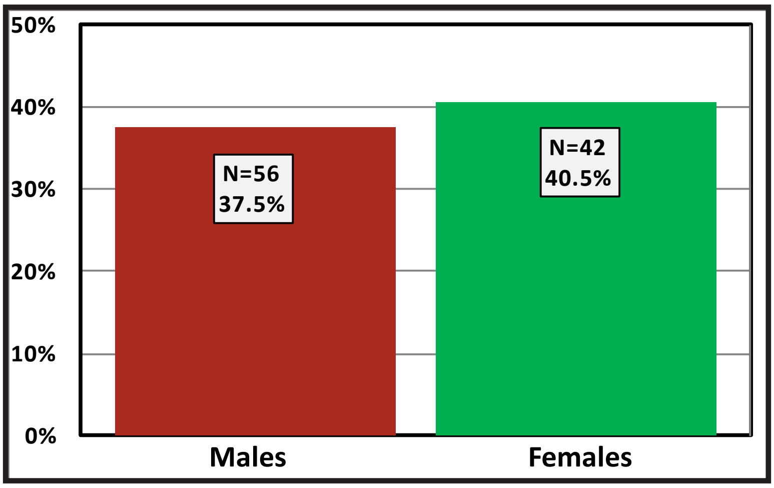

Figure 8.53, Histogram of Osteoarthritis Prevalence in the Shoulder by Sex.

An HGLM test shows that neither age, sex, nor religion are important factors in the separation of religious groups (Fg 8.54).

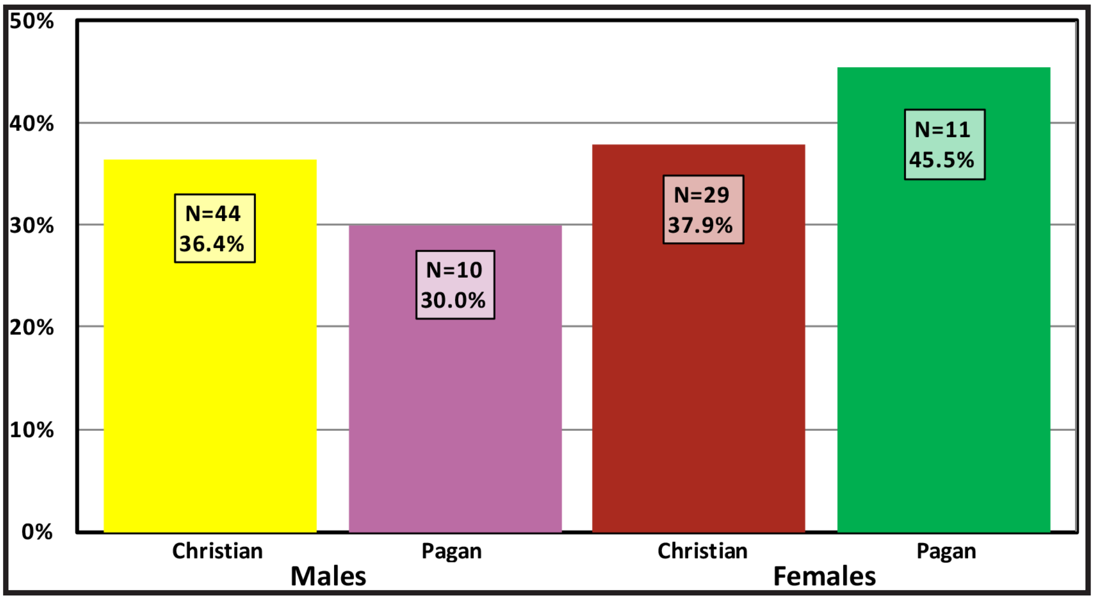

Figure 8.54, Histogram of Osteoarthritis Prevalence in the Shoulder by Religion.

A similar result occurred when an HGLM was performed on the ethnic groupings: there were no important factors in group separation. However, Fg 8.55 does depict 'native' males having a higher prevalence of shoulder osteoarthritis than 'Norse' males or of females of either ethnic category. A chi^2 test confirms this as statistically significant: $p=0.003$, $X^2=13.681$, $df=3$. The age structures of the two populations are statistically different and this may

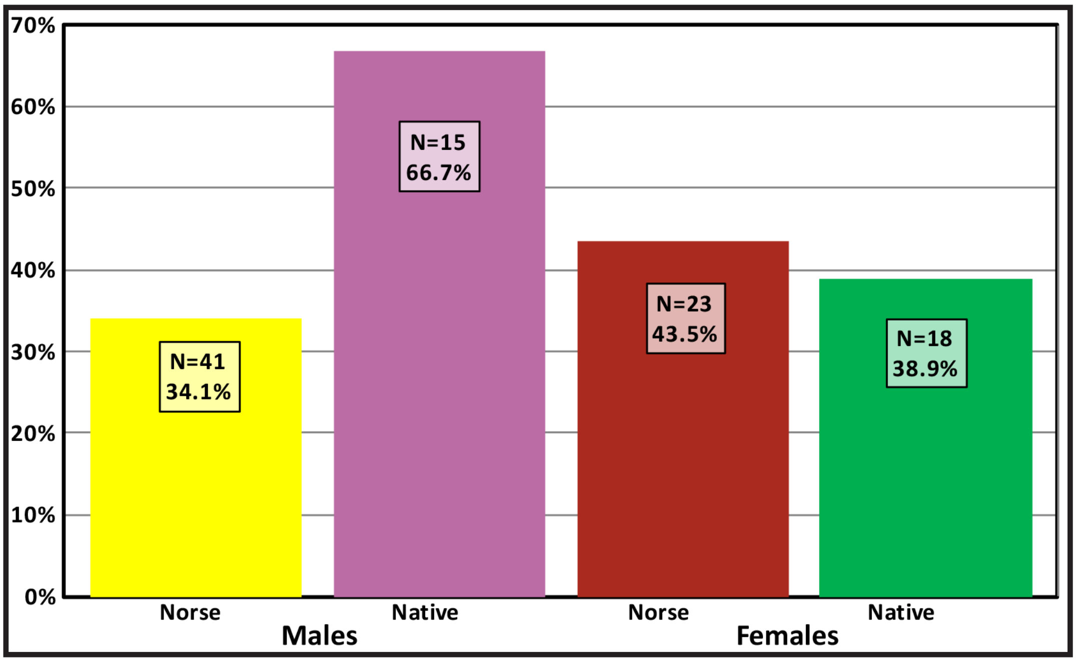

Figure 8.55, Histogram of Osteoarthritis Prevalence in the Shoulder by Ethnicity.

be biasing the statistical analyses. Figure 8.55 does not illustrate a separation by age, and this missing factor may account for some of the discrepancy between the HGLM and chi^2 tests.

There were not enough individuals to separate sex or age in the site types; thus, an HGLM was not attempted (Fg 8.56). Chi^2 testing confirms a

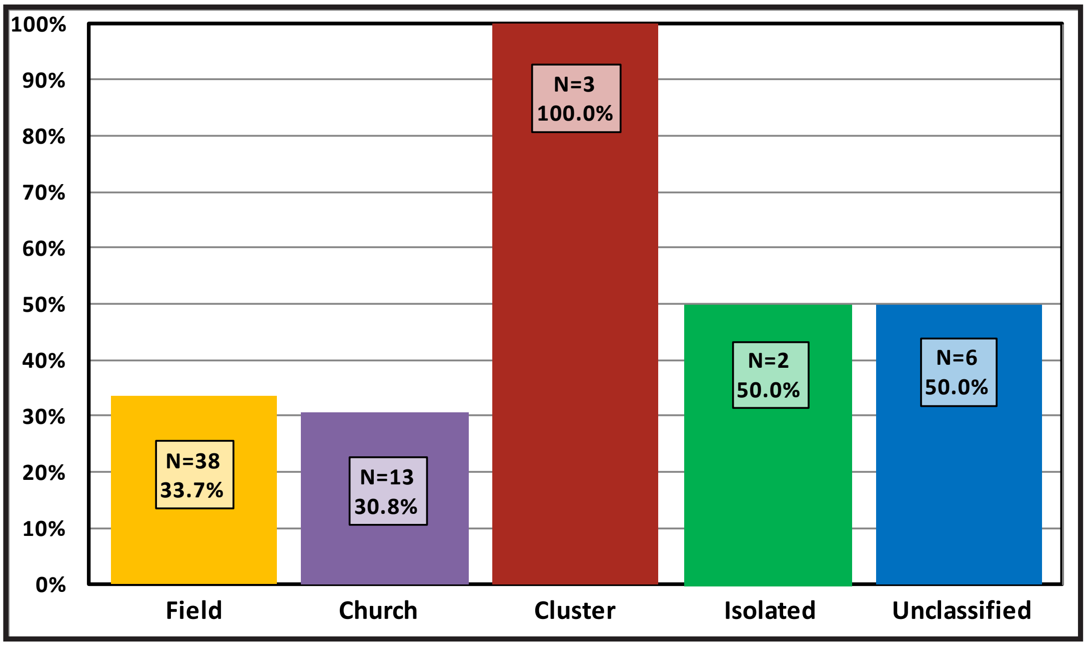

Figure 8.56, Histogram of Osteoarthritis Prevalence in the Shoulder by Site Type.

statistically significant difference: $p=0.001$, $X^2=58.455$, $df=4$. Low numbers suggest that his result should be taken with caution.

Glenohumeral osteoarthritis is considered rare in modern, clinical medicine (Hagberg and Wegman 1987, Kerr *et al* 1985). Edelson (1995), for example, found evidence of this in 184 of 486 mid-20th century skeletons (37.86%) with documented ages of 60-100. With the knowledge that joint degeneration increases with age, it is not unexpected that these ‘old’ individuals would show evidence of shoulder OA; however, the population in *this* research shows a higher prevalence in a younger age group (48.3%, middle adults) and a similar rate for the even younger young middle adults (34.6%). At early modern Christ Church, Spitalfields, only 5 males (1.39%) and 10 females (2.89%) had osteoarthritis of the glenohumeral joint. This is from the entire adult population, not just the elderly. Further investigation of this anomaly may be warranted for this early mediaeval Scottish population.

8.7.4 Hip Osteoarthritis

Joint changes for the hip were determined via the methods in Section 5.3.7. To maximise results from incomplete or fragmented skeletons, joint surfaces were combined. The femoral head and acetabulum were assessed for porosity, osteophytosis, and eburnation for each individual and side. If a surface exhibited porosity and osteophytosis or eburnation, osteoarthritis was recorded as present for that individual.

Osteoarthritis prevalence in the hip does, as would be expected, increase by age group for this early mediaeval population (Fg 8.57, chi^2 test results: $p=0.001$, $X^2=26.844$, $df=4$).

Figure 8.58 shows females with a higher prevalence of hip osteoarthritis than males and chi^2 test results confirm this is statistically significant: $p=0.016$, $X^2=5.803$, $df=1$.

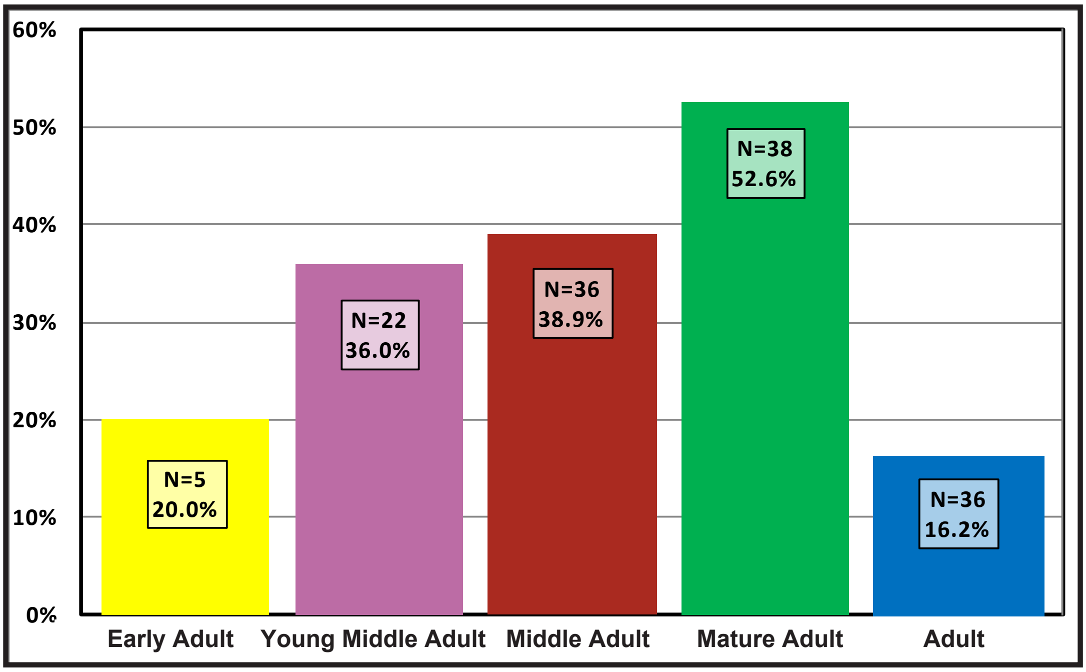

Figure 8.57, Histogram of Osteoarthritis Prevalence in the Hip by Age Group.

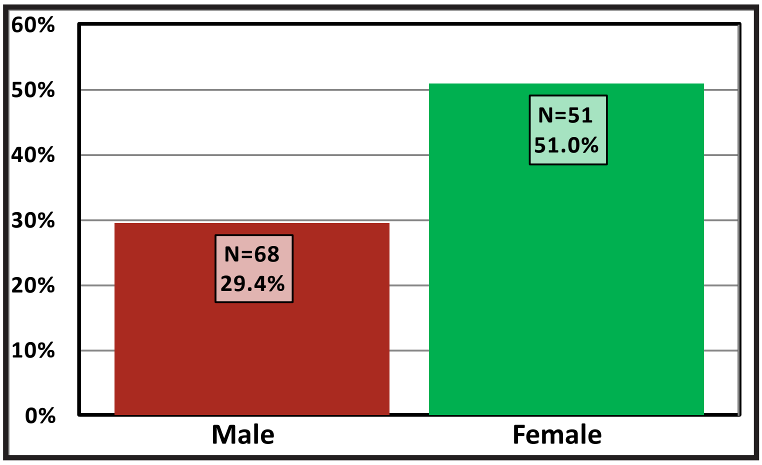

Figure 8.58,

Histogram of Osteoarthritis Prevalence in the Hip by Sex.

An HGLM (Table 8.27) shows that important factors are sex, age,

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	1.3265	4.91%	0.9563	0.9563	4.42	0.038
Age	4	1.6844	6.23%	1.7622	0.4405	2.04	0.095
Religion	1	0.8434	3.12%	0.8434	0.8434	3.90	0.051
Error	107	23.1633	85.73%	23.1633	0.2165		
Lack-of-Fit	10	1.9918	7.37%	1.9918	1.992	0.91	0.525
Pure Error	97	21.1714	78.36%	21.1714	0.2183		
Total	113	27.0175	100.00%				

Table 8.27, ANOVA Results from an HGLM for Hip Osteoarthritis by Religion.

and then religion; age, however, was not statistically significant. Results suggest that 'Christians' have a higher prevalence of osteoarthritis in the hip than 'pagans' (Fg 8.59). Chi^2 test results confirm a statistically significant difference: $p<0.001$, $X^2=24.344$, df=3.

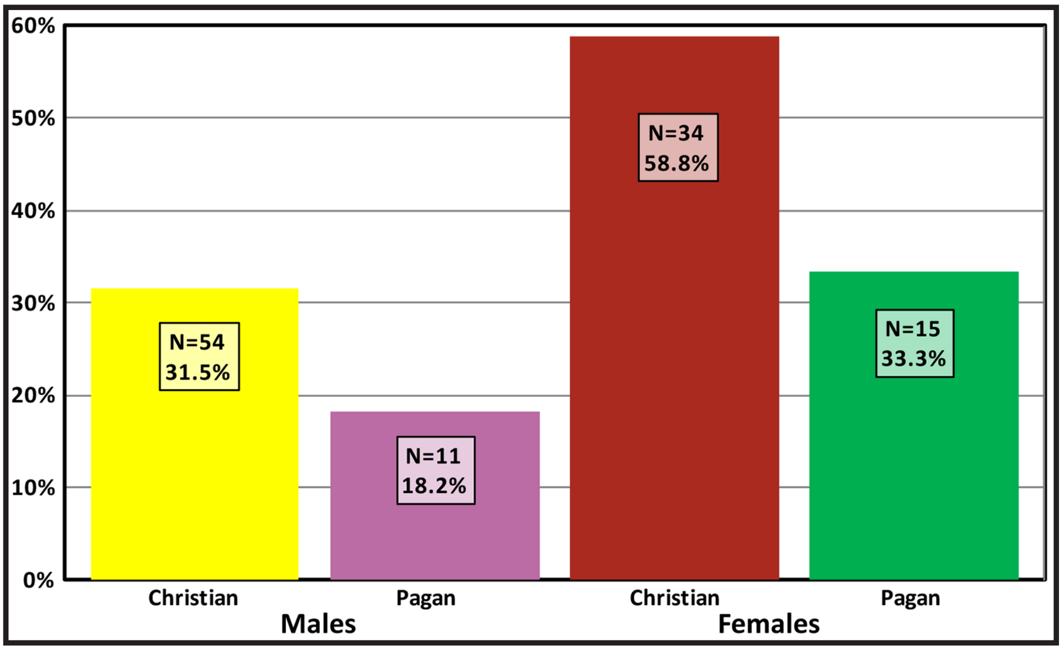

Figure 8.59, Histogram of Osteoarthritis Prevalence in the Hip by Religion.

Figure 8.60 illustrates the prevalence of hip osteoarthritis by ethnicity.

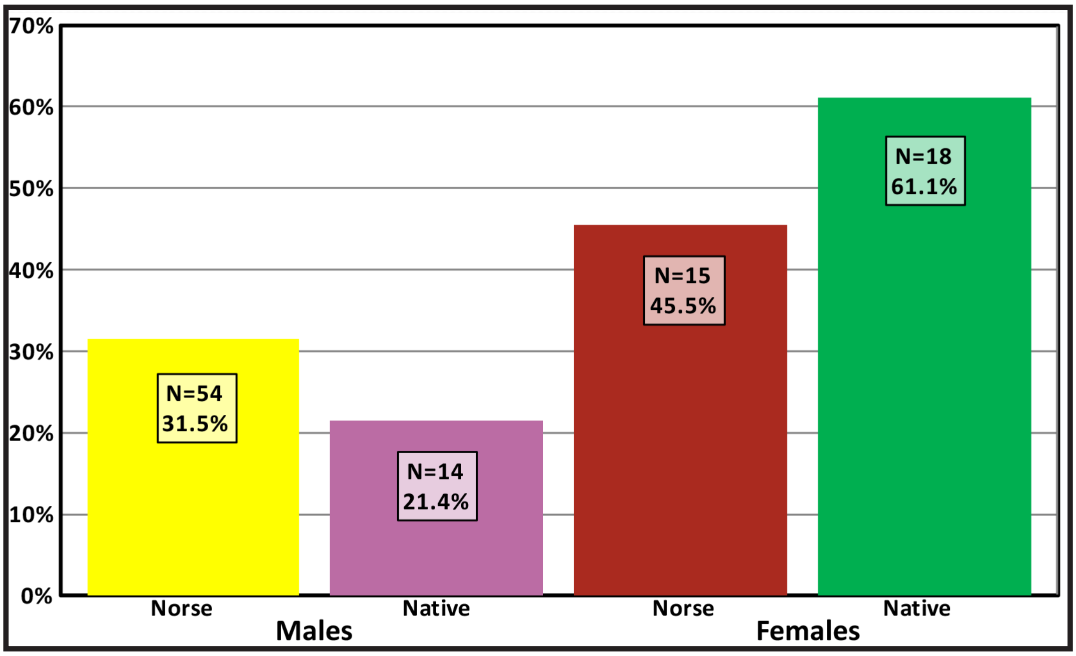

Figure 8.60, Histogram of Osteoarthritis Prevalence in the Hip by Ethnicity.

Females show a higher occurrence than males, and native females show the highest rate of all: (Chi² Test: $p=0.001$, $X^2=22.41$, $df=3$). An HGLM performed with ethnic groupings reveals it is sex and then age which are important factors in group division; although, neither factor is statistically significant (Table 8.28). Ethnicity is not significant in dividing the population.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	1.356	4.8%	0.7516	0.7516	3.37	0.069
Age	4	1.666	5.90%	1.6656	0.4164	1.87	0.121
Error	112	25.197	89.29%	25.1972	02230		
Lack-of-Fit	13	1.980	7.02%	1.9796	0.1650	0.72	0.731
Pure Error	101	23.218	82.28%	23.2176	0.2299		
Total	118	28.218	100.00%				

Table 8.28, ANOVA Results from an HGLM for Hip Osteoarthritis by Ethnicity.

Figure 8.61 does show a high rate of hip osteoarthritis in the isolated and unclassified site types; however, the number of individuals for both groups is low and this should be viewed with caution. A similar result was obtained in an HGLM analysis by site type (Table 8.29). Site type was not a significant separation factor.

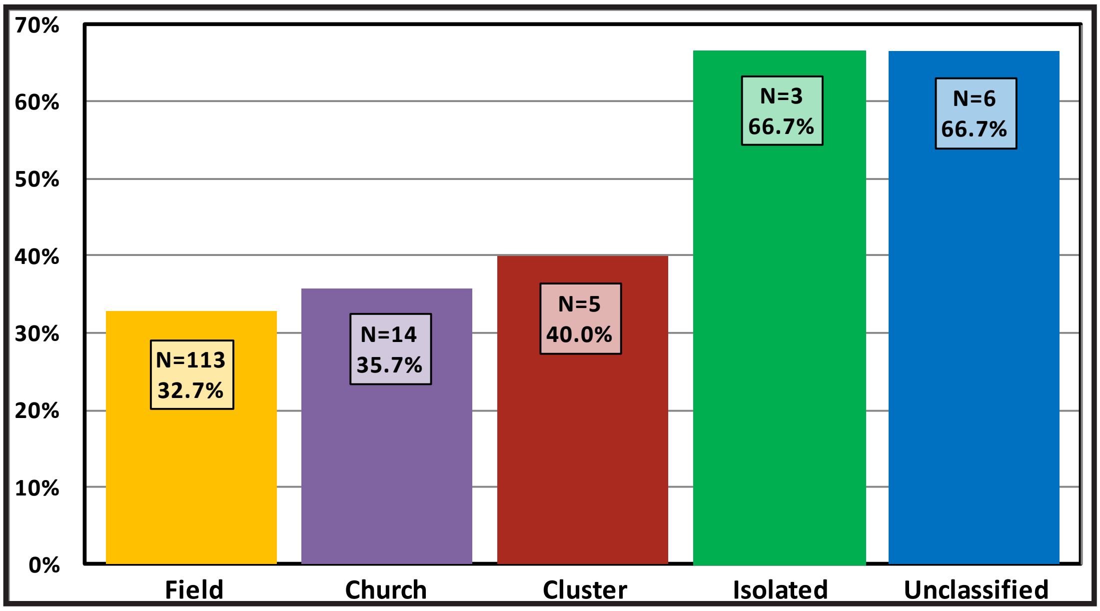

Figure 8.61, Histogram of Osteoarthritis Prevalence in the Hip by Site Type.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	1.356	4.8%	0.7516	0.7516	3.37	0.069
Age	4	1.666	5.90%	1.6656	0.4164	1.87	0.121
Error	113	25.197	89.29%	27.1972	0.2230		
Lack-of-Fit	20	5.391	19.10%	5.3909	0.2695	1.27	0.222
Pure Error	93	19.806	70.19%	19.8062	0.2130		
Total	118	28.218	100.00%				

Table 8.29, ANOVA Results from an HGLM for Hip Osteoarthritis by Site Type.

These results generally compare to modern clinical data. These studies indicate that hip osteoarthritis is one of the most common causes of elderly debilitation and is more common in females than in males (Dagenais *et al* 2009, Jordan *et al* 2009). This seems to have also been the case in the Iron Age: 28% of 50 Saxon skeletons (Rogers *et al* 1981: 1669) and yet the rates decreased during the mediaeval period: 10% of 150 English individuals. Waldron (1995) indicates the rate of hip OA decreases over time across England from the Iron Age (12.8%), to the mediaeval—11-16th centuries (5.7%), and into the early modern—17-19th centuries (2.9%). This is from a study of 2635 individuals. This suggests it may be worth further exploration into the higher rates of hip OA in this early mediaeval Scottish population.

8.7.5 Knee Osteoarthritis

Joint changes for the knee were also recorded according to the methodology outlined in Section 5.3.7. Information from both distal femoral and proximal tibial condyles were combined to gain the most information possible to use in the analyses. Both features were assessed for porosity, osteophytosis, and eburnation. Osteoarthritis was recorded as present for an individual if Waldron's criteria (2009: 33-4) were met.

Figure 8.62 does depict an increase in osteoarthritis by age group. A chi^2 test confirms the statistically significant difference: $p=0.001$, $X^2=43.584$, $df=4$.

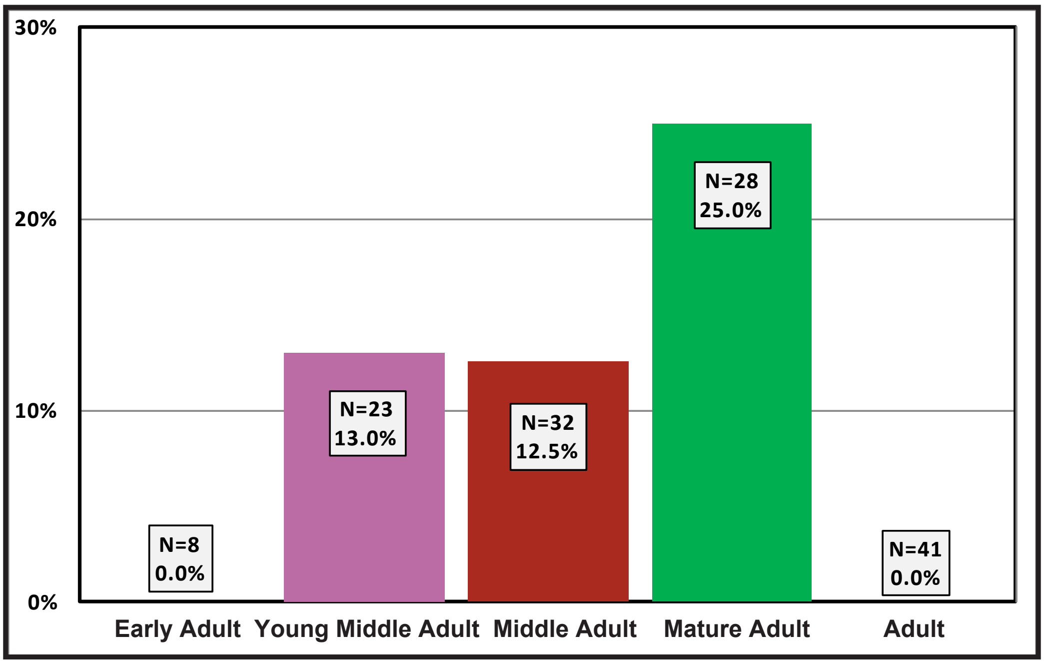

Figure 8.62, Histogram of Osteoarthritis Prevalence in the Knee by Age Group.

Females do show a greater prevalence of knee osteoarthritis (Fg 8.63); however, a chi^2 test indicates this is not significant: $p=0.157$, $X^2=2.002$, $df=1$.

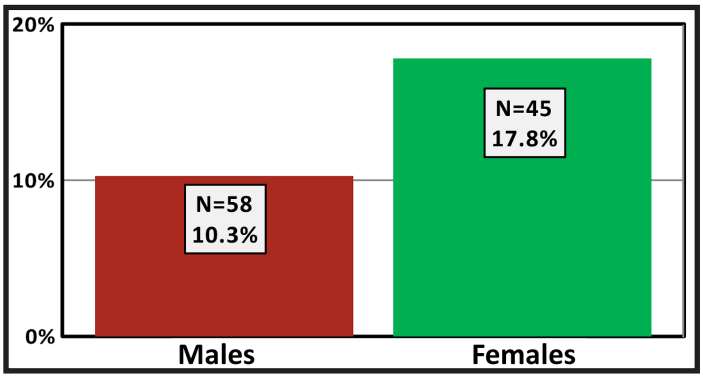

Figure 8.63, Histogram of Osteoarthritis Prevalence in the Knee by Sex.

An HGLM performed on religious groups (Table 8.30) reveals age is the important factor in group separation; although, this is not a statistically significant ANOVA result. In the ethnic groups there is a comparable situation. HGLM suggests it is age and then ethnicity which are the key factors in group separation (Table 8.31).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	4	0.9264	7.66%	0.9264	0.2316	2.03	0.096
Error	98	11.1707	92.34%	11.1707	0.1140		
Lack-of-Fit	15	2.1421	17.71%	2.1421	0.1428	1.31	2.13
Pure Error	83	9.0286	74.63%	9.0286	0.1088		
Total	102	12.0971	100.00%				

Table 8.30, ANOVA Results from an HGLM for Knee Osteoarthritis by Religion.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	4	0.9264	7.66%	1.0070	0.25174	2.24	0.070
Ethnicity	14	0.2615	2.16%	0.2615	0.26153	2.23	0.131
Error	97	10.9092	90.18%	10.9092	0.11247		
Lack-of-Fit	12	1.1220	9.28%	1.1220	0.09350	0.81	0.637
Pure Error	85	9.7871	80.90%	9.7871	0.11514		
Total	102	12.0971	100.00%				

Table 8.31, ANOVA Results from an HGLM for Knee Osteoarthritis by Ethnicity.

This seems to contradict the histograms illustrating the religious and ethnic data. Figure 8.64 shows ‘pagan’ females with a higher rate of knee osteoarthritis than ‘pagan’ males or ‘Christians’ of either sex. A chi^2 test confirms a statistical significance to this difference: p=0.001, X^2=34.284, df=3.

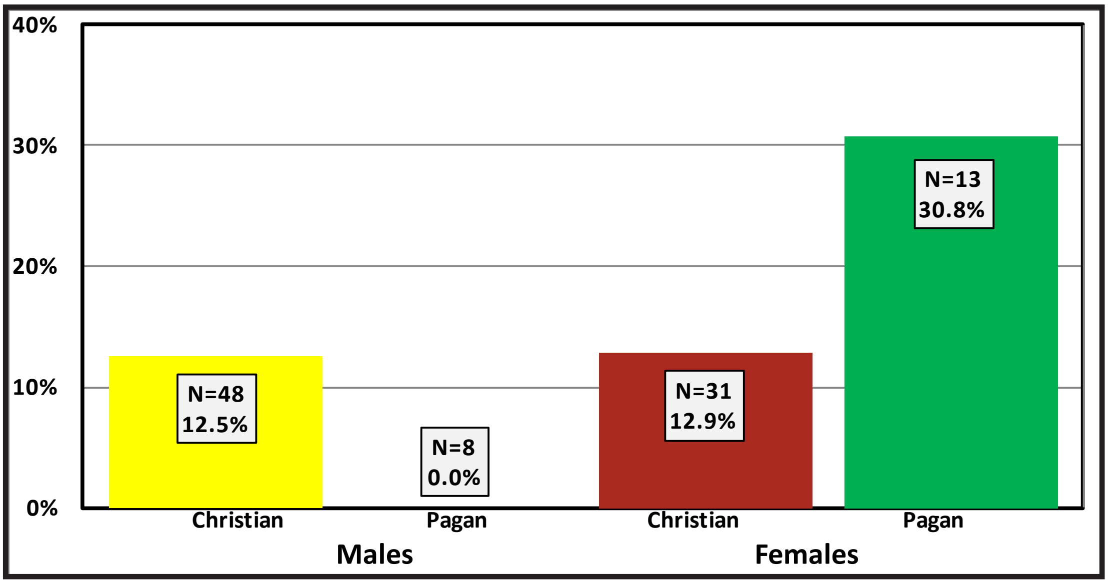

Figure 8.64, Histogram of Osteoarthritis Prevalence in the Knee by Religion.

Figure 8.65 shows 'Norse' females have a higher prevalence of knee osteoarthritis than any of the other groups. Again, a chi^2 test confirms a statistical significance to this difference: $p<0.001$, $X^2=17.016$, df=3.

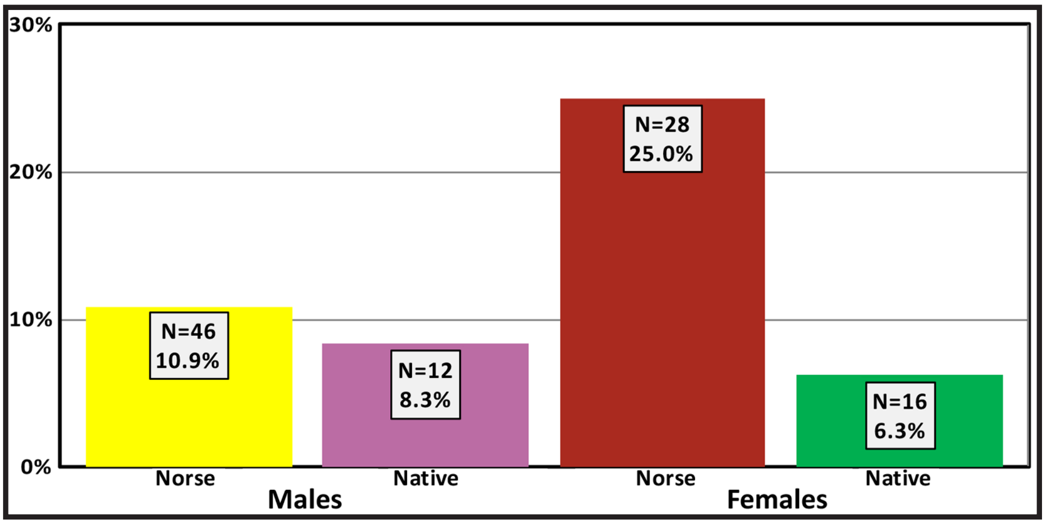

Figure 8.65, Histogram of Osteoarthritis Prevalence in the Knee by Ethnicity.

These figures suggest that sex *is* a key factor in division of these groups. However, neither histogram shows the division by age. Additionally, numbers for 'pagan' and 'native' groups are low and both the lack of visualisation of age and low 'N's may be masking the difference detected in the HGLM.

Figure 8.66 indicates that the unclassified group has a higher prevalence of knee osteoarthritis than the other groups. HGLM by site type indicates that,

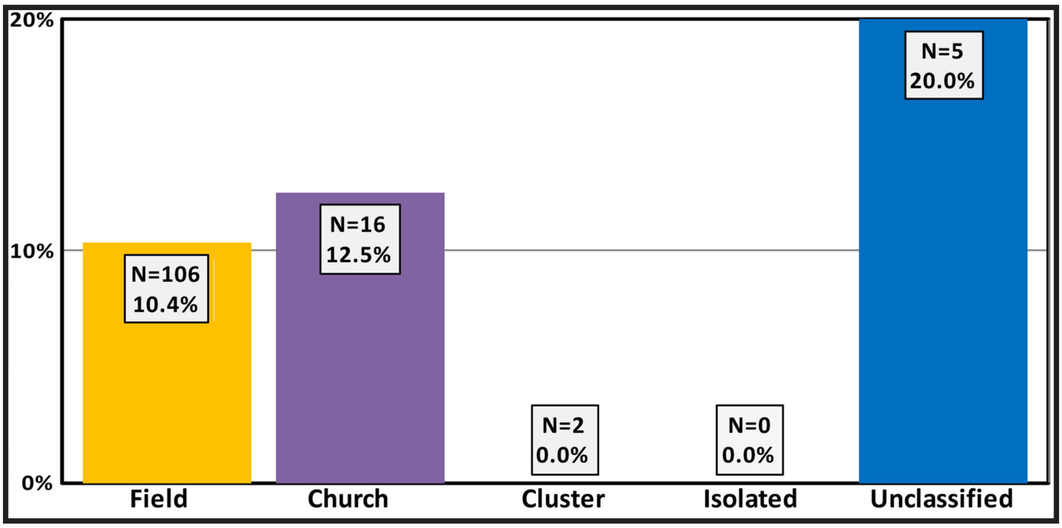

Figure 8.66, Histogram of Osteoarthritis Prevalence in the Knee by Site Type.

once again, age is the major factor in group separation (Table 8.32). A chi^2 test (without the isolated or cluster categories due to low numbers) confirms the difference is not significant: p=0.168, X^2=3.562, df=2.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	4	0.9264	7.66%	0.9264	0.2316	2.03	0.096
Error	98	11.1707	92.34%	11.1707	0.1140		
Lack-of-Fit	19	2.1485	17.76%	2.1485	0.1131	0.99	0.481
Pure Error	79	9.0222	74.58%	9.0222	0.1142		
Total	102	12.0971	100.00%				

Table 8.32, ANOVA Results from an HGLM for Knee Osteoarthritis by Site Type.

Waldron (1995: 386) indicates the rate of knee osteoarthritis increases over time across the 2635 individuals in his geographically English population: Iron Age (2.1%) to the mediaeval—11-16th centuries (5.0%), and then decreases a bit in the early modern—17-19th centuries (4.4%). Rogers and Dieppe (1994) found that only 1.78% of their 785 Saxon to post-mediaeval[4] English individuals exhibited knee OA. This may indicate that some of the groups in this early mediaeval Scottish population, particularly the younger cohorts, may have a level of knee OA which warants further investigation.

8.7.6 Discussion of Joint Changes, Degeneration, and Disease

In general, statistical analyses show little difference between the various group clusters: religion, ethnicity and site type. The bulk of the variation is seen in age and sex; a not uncommon situation in most populations. Within the vertebrae, ethnicity was a key factor in group division and 'Norse' males did show a higher rate of vertebral degeneration overall; although not statistically significant in an ANOVA (Table 8.21, Fg 8.45).

Histograms show that 'native' males have the lowest rate of osteoarthritis

4 More concrete dates or population demographics are not given in this article.

in the elbow and the highest rate in the shoulder (Fgs 8.50 and 8.55); however, factor analyses did not confirm these results.

HGLM also shows ethnicity is an important factor in the knee, and the ‘Norse’ do show a higher rate than the ‘natives’, particularly the females (Fg 8.65); although, ANOVA did not verify a statistically significant variation (Table 8.31). This could be a sign of (epi)genetic differences between the ‘Norse’ and ‘native’, this could be an indicator of a different type of activities between the two ‘ethnicities’, or this could be a combination of (epi)genetics and usage.

The hip is the only joint that does not show ethnicity as a key factor. Here it is religion which is important for group separation, and this is a significant difference shown in the ANOVA results (Table 8.27). Figure 8.59 shows females having a higher rate of OA than males and ‘Christians’ having a much higher rate of hip osteoarthritis than ‘pagans’. Research has show that, while there is a heredity component to OA in the hip, mechanical load plays a considerable part: a 40% correlation to occupational factors in one study (Hoaglund and Steinbach 2001); as much as 2.9 times risk factor for young athletes to develop it later in life (Cooper *et al* 1998: 520); and as much as 3.3[5] with a body mass index above 28; ie obese (Cooper *et al* 1998: 518). This suggests a lifestyle difference between ‘Christians’ and ‘pagans’.

The bulk of the variation seen in this early mediaeval Scottish population, however, was found in the factors of age and sex. More data and investigation would be needed to ascertain the significance of the ‘ethnic’ and ‘religious’ differences reflected in the pages above.

8.8 Further Joint Disease and Bone Changes

In addition to the changes to the larger joints, several individuals exhibited changes to the temporomandibular joint and to the first digit of the foot.

5 Mean 1.9; 95% CI=1.1-3.3; p=0.02

8.8.1 Temporomandibular Joint Degeneration

Temporomandibular joint degeneration, or TMJ, can occur as a result of age, overuse, or systemic factors (Haskin *et al* 1995). The common in vivo presentation is a limitation in mobility at the joint. Osteologically, TMJ degeneration presents as surface pitting, osteophytosis, porosity and shape changes (Fg 8.67).

Figure 8.67, Carlisle 7 Glenoid Fossae with Degeneration on the Zygomata (Author's Image).

There was no appreciable difference between males and females in TMJ rates (chi^2 results: $p=0.174$, $X^2=1.847$, $df=1$; Fg 8.68); however, there is a significant difference between the age groups (chi^2 results: $p<0.001$, $X^2=53.277$, $df=5$; middle and old child groups not included due to low number of individuals).

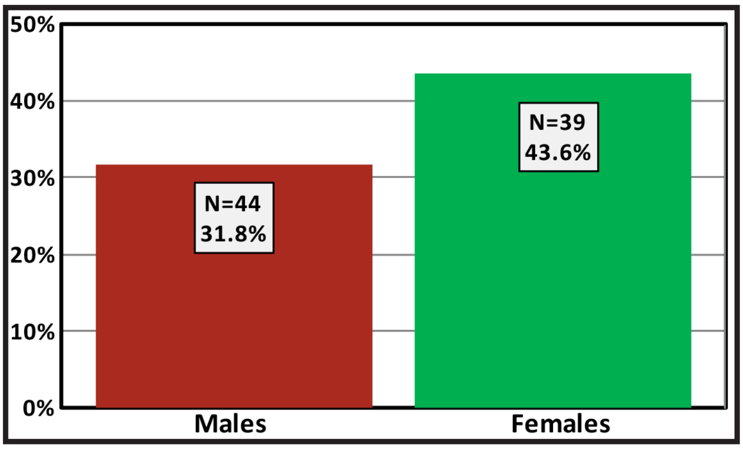

Figure 8.68,

Histogram of Temporomandibular Joint Disease Prevalence by Sex.

Figure 8.69 indicates the youngest and oldest have the highest rate of TMJ. It is unclear why this occurred; however, this may be a companion to the larger mechanism(s) which result in the bathtub mortality curve; ie: the largest numbers of the dead will be in the youngest and the oldest.

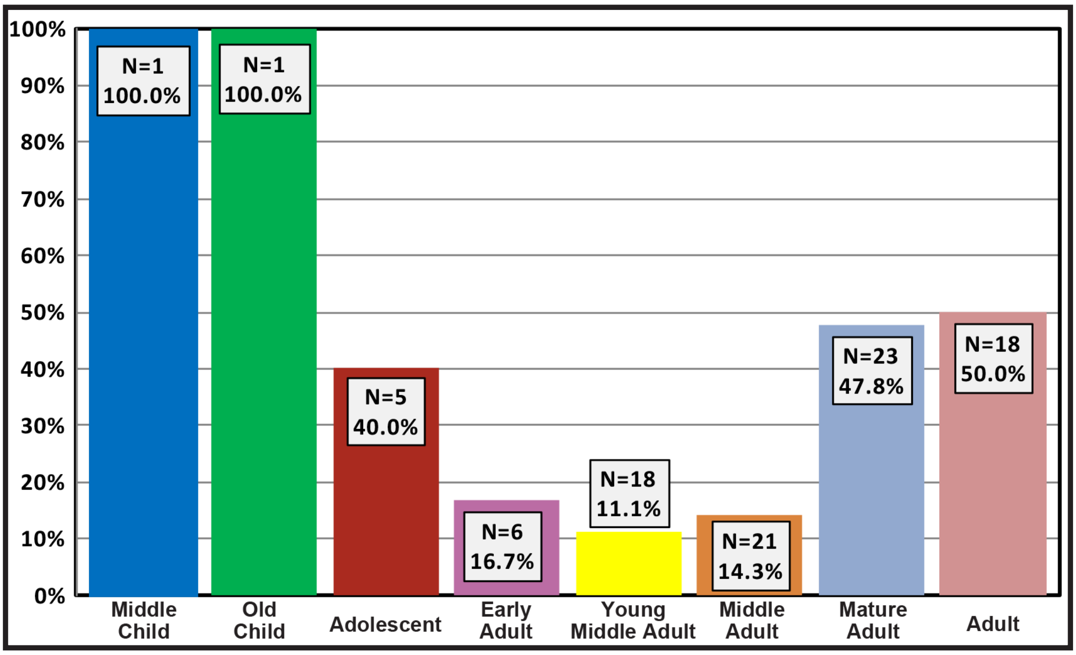

Figure 8.69, Histogram of Temporomandibular Joint Disease Prevalence by Age Group.

Histograms indicate differences between the religious and site type groups (Fg 8.70 and 8.71). Ethnicity showed no appreciable difference (8.72).

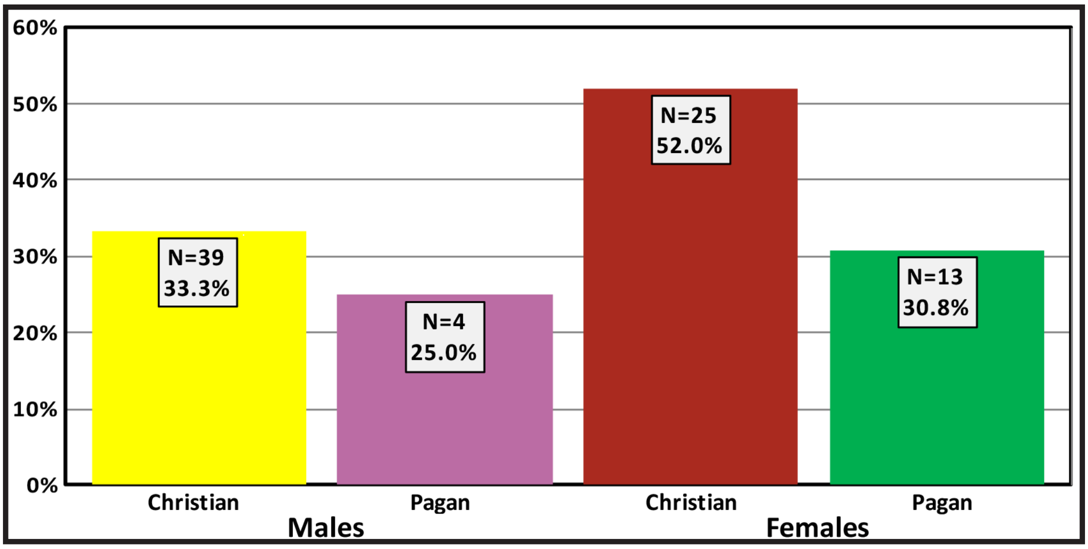

Figure 8.70, Histogram of Temporomandibular Joint Disease Prevalence by Religion.

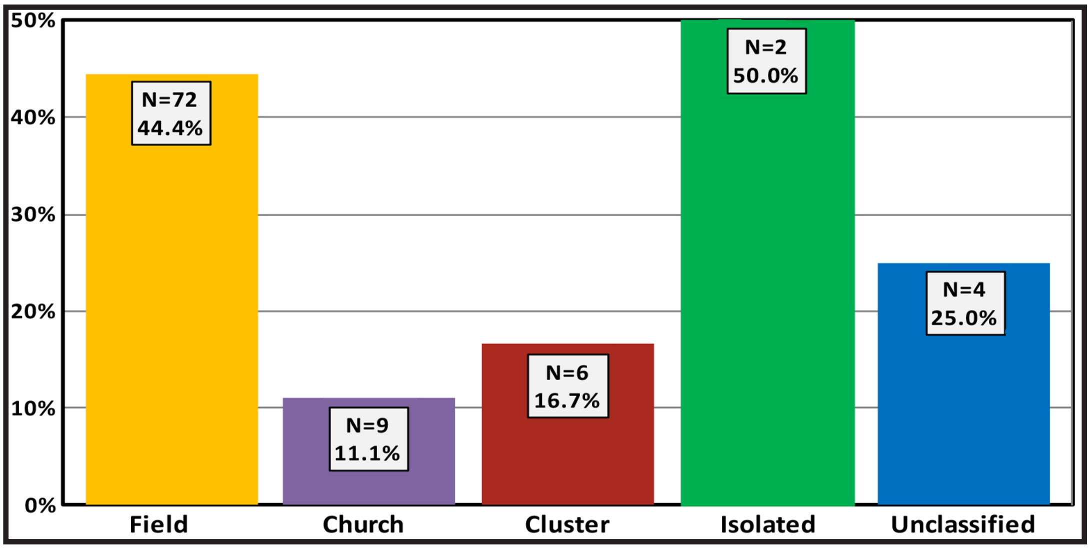

Figure 8.71, Histogram of Temporomandibular Joint Disease Prevalence by Site Type.

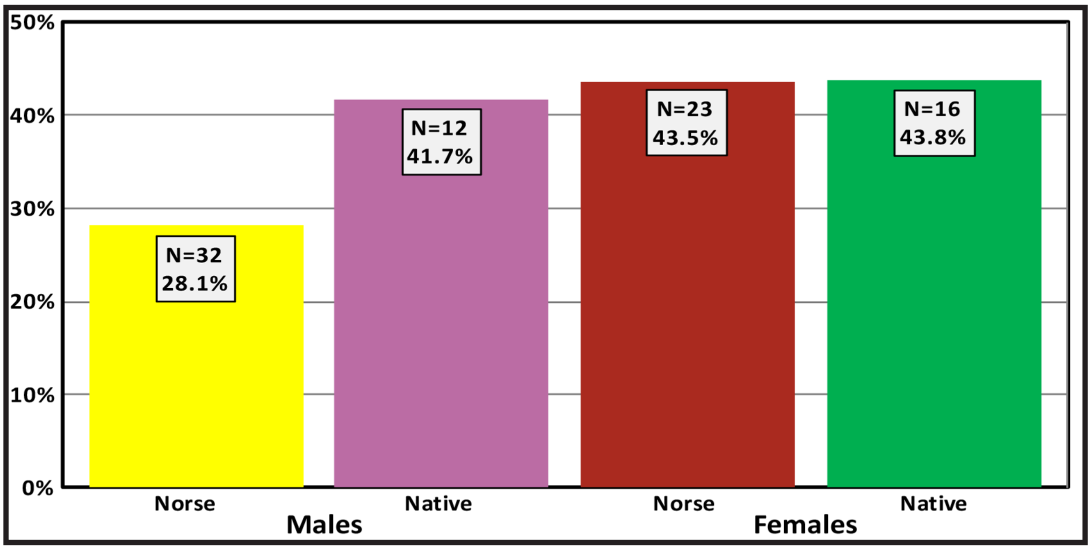

Figure 8.72, Histogram of Temporomandibular Joint Disease Prevalence by Ethnicity.

A chi² test confirms these are both statistically significant results (religion: $p=0.009$, $X^2=11.601$, $df=3$; site type: $p<0.001$, $X^2=26.061$, $df=3$, isolated excluded due to low number). In separation by religion, 'Christians' have a higher rate of TMJ than 'pagans' with 'Christian' females having the highest rate of all four groups. The rate of TMJ is lowest in the church group and highest in the isolated category, closely followed by the field group.

However, HGLM tests were run on religious, ethnic and site types (sex and age as factors). None of the components proved key in group separation.

8.8.2 Changes in the Halluces

Although hallux valgus can occur as congenital or developmental (Guzzanti and di Lazzaro 1989), the majority of instances are the result of narrow footwear, especially that which narrows at the distal end (Coughlin and Jones 2007). This compresses the toes and causes the hallux to deviate medially (Fg 8.73). Complications from hallux deviation and digit space narrowing can produce instability, bunions, bursitis, arthritis, and neuromas (Coughlin and Jones 2007, Jain and Mannan 2013, Kadakia *et al* 2013).

Figure 8.73, Inferior Left Hallux from Cnip D with Valgus Deformity (Author's Image).

Osteological components involve articular shape malformations and can involve fusion of the joint(s) (Fg 8.74).

Figure 8.74, Proximal Hallux Phalanges with Articular Shape Changes from Westness 11 (Author's Image).

More severe cases of valgus deformity can result in limited or no mobility in the digit: hallux limitus and hallux rigidus respectively (Botek and Anderson 2011, Coughlin and Shurnas 2013). Hallux limitus and rigidus can be caused by soft tissue factors which, in all probability, would not be evident in the bone.

Differential preservation limited the number of extant pedal bones. Thirty six individuals exhibited hallux valgus deformity across the assemblage: 14 males, 19 females, and three indeterminate; a 90.0% prevalence rate, based on the number of individuals with halluces (see Table 8.33 for site frequencies).

Site	H. Valgus	H. Rigidus	Bursitis
Breckness	0	0	1
Birsay	1	0	0
Carlisle	1	0	0
Cnip	3	1	0
Captain’s Cabin	15	0	2
John o’ Groats	2	0	1
Newark	1	0	1
St. Ninian’s Bute	3	0	0
St. Ninian’s Isle	2	0	0
Westness	10	2	2

Table 8.33, Frequencies of Hallux Pathologies by Site. Sites with no Occurrences not Listed.

Seven of these individuals exhibited osteolytic cavitations in the bursar area of the first metatarsal (Fg 8.75). This pathology is consistent with degeneration due to bursar inflammation (Mays 2005), and most likely indicates bursitis. No statistical difference was evident between the four males and three females with this condition: chi^2 test, p=0.143, X^2=0.705, df=1.

Figure 8.75, Pits in the Bursar Region of the 1st Metatarsals of Westness 28A.

A further three individuals—all males—exhibited articular remodelling which would have limited mobility. This suggests hallux limitus if not rigidous.

8.9 Upper Respiratory Bone Proliferation

Irritation of the sinus and nasal tissue can cause bone proliferation on the surfaces of the upper respiratory tract (Merrett and Pfeiffer 2000, Roberts 2007). Infection—bacterial, viral, and fungal—is commonly given as a causal agent; however, histamine reactions can also contribute. Due to the enclosed nature of the sinuses, macroscopic examination of the cavities is not typically possible without cranial destruction. Taphonomic breakage revealed twenty-six individuals with sinus bone proliferation (Table 8.34). Poor preservation of fragments in addition to the intact skulls made a comprehensive analysis unattainable.

Site	Number Individuals	Total Population
Birsay Bay	1	10
Captain’s Cabin	16	76
Iona	1	3
John o’ Groats	5	59
Newark	1	72
Westness	2	30

Table 8.34, Frequencies of Respiratory Bone Proliferation. Sites with no Evident Proliferation are not Listed.

Figure 8.76 ilustrates this bone proliferation in the maxillary sinus of individual 28A from Westness. In this instance, a conduit had been created by the body in the form of a fistula to drain the apparently chronic suppuration.

Figure 8.76, Maxillary Bone Proliferation and Fistula of Westness 28A (Author’s Image).

8.10 Degeneration of the Petrosal

Three individuals displayed perforating cribriform lesions on the infracranial surface of the petrosal cortical bone (Fg 8.77, Table 8.35). Endoscopic investigation also revealed some active bone on the corresponding surface of the acoustic meatus.

Figure 8.77, Cribraform Perforations in the Superior Surface of the Petrosal from John o' Groats 21 (Author's Image).

Site	Indiv	Age	Sex
Captain's Cabin	004	Adult	Female
John o' Groats	21	Young Middle Adult	Male
Westness	28A	Young Middle Adult	Female

Table 8.35, The Individuals with Cribriform Perforations in the Petrosal Cortical Bone.

The most likely explanation for this pathology is chronic and possibly malignant otitis media. Otitis media, an ear infection, is still a very common occurrence in the modern world (Chole and Sudhoff 2010). However, the relatively widespread and quick treatment with antibiotics has practically eliminated the once more common complications of mastoiditis and petrous apicitis (Eagleton 1936, Lammers and Krieser 2013). Normal anatomy of the human ear is such that the acoustic meatus is connected to the mastoid cells by a small canal on the superior portion of the auditory canal. Bacteria (most commonly), fungi, and viruses can invade the auditory canal (Chole and Sudhoff 2010, Gruppe 1935, Verhoeff *et al* 2006). Left untreated, the infection can spread to the mastoid cells and will eventually erode and perforate the bone of the petrous pyramid. If the infection perforates the petrosal bone it can affect the cranial nerves resulting in neuralgia, palsy, paralysis, and vertigo, to name but a few (Felisati and Sperati 2009, Gruppe 1935, Lammers and Krieser 2013).

8.11 Systemic Conditions

A number of systemic conditions leave evidence in the bones. Time, resources, and skeletal preservation made an extensive analysis of the collection for all, commonly, recognised systemic conditions impractical. This section will give an accounting of such systemic conditions which were noted by this researcher in the early mediaeval population studied in this thesis (See Section 8.13 for individual case studies).

8.11.1 Diffuse Idiopathic Skeletal Hyperostosis

Although trauma to the spinal ligament can produce an ossification of the traumatised area, the presence of an ossification along the longitudinal spinal ligament is most commonly understood as a key diagnostic factor in or Diffuse Idiopathic Skeletal Hyperostosis, or DISH (Rogers and Waldron 2001). At its very basic definition, DISH is an ossification of the ligaments and entheses (Rogers and Waldron 1995: 54). As yet, the aetiology of DISH is poorly understood. In archaeological studies it has been linked to the monastic way of life and has also been proposed as an outcome of an overly rich diet (Rogers and Waldron 2001, Verlaan *et al* 2007). Recent research suggests a complex system involving the expression of the BMP-2 gene, hormonal dysfunction, diabetes, and salt consumption in the diet (Li *et al* 2007, Musha 1990, Okamoto *et al* 2004, Tanaka *et al* 2001).

One individual, Captain's Cabin 29, exhibited changes consistent with DISH, along with an additional two individuals who illustrated an early progression of the disease (Fg 8.78).

Young Middle Adult Male from Captain's Cabin (29)

Indeterminate Sexed Adult from Newark (69.1.2)

Young Middle Adult Female from Westness (28a)

Figure 8.78, The Individuals with Ossification of the Spinal Ligament (Author's Images).

8.11.2 Hypervascularised Deep Vessel Impressions

Several individuals exhibited depressions in the cervical surface of the vertebral bodies. The feature was first noticed in juveniles (Fg 8.79). These depressions were normally discovered in conjunction with enlarged vascular foraminae in the thoracic and lumbar area. Most vertebrae with these hypervascularised deep vessel impressions (HVVI) also exhibited cortical bone remodelling; although the impressions themselves were generally smoothed walled. As the vertebrae of sub-adults are often hypervascularised due to the increased flow of nutrients to the developing spine (Lustrin *et al* 2003), the initial interpretation was that this was within normal parameters. However, it became evident that the condition was apparent in 21 individuals across the age groups (Fg 8.80).

Figure 8.79, Juvenile Vertebral Bodies from Captain's Cabin 42 (Author's Image).

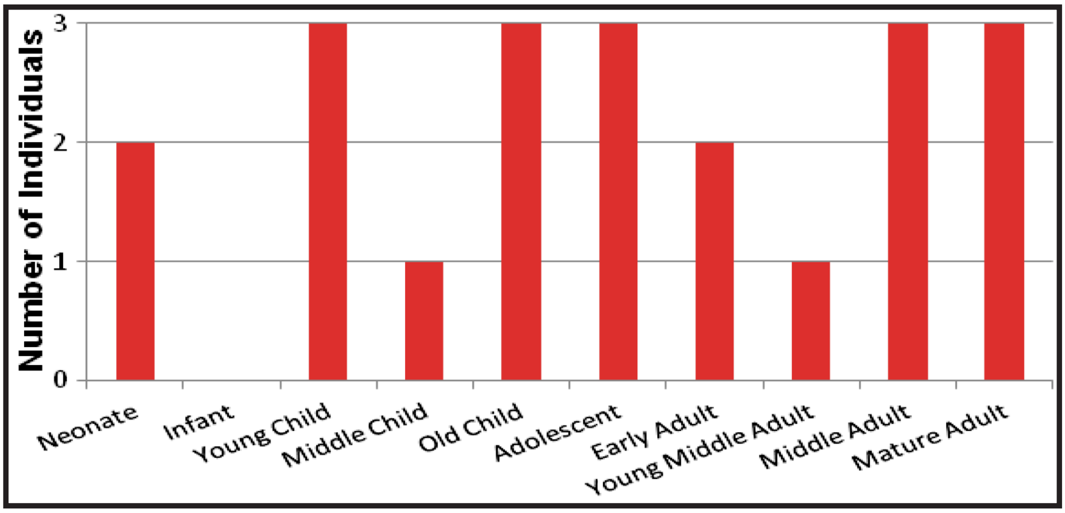

Figure 8.80, Number of Individuals with HVVI by Age Group.

The presence of HVVI, especially with cortical remodelling, has been minimally discussed in archaeological and anthropological literature, and often as a potential indicator of early tuberculosis (Bereczki *et al* 2012, Haas *et al* 2000, Roberts and Buikstra 2003). However, Mutolo and colleagues (2012) sequenced the DNA from these types of lesions on individuals from 10th to 13th century Albania and found the mycobacterium affecting these skeletons was brucellosis, not tuberculosis.

The *brucella* spp. is also a mycobacterium, and like tuberculosis, brucellosis is a granulomatous disease (Franco *et al* 2007, Pappas *et al* 2006). As yet, it is unknown the dissemination of brucellsis in the past; however, today it is the most common zoonosis in the world (Bozgeyik *et al* 2014, Thakur *et al* 2002). The aetiology and pathogenesis of *M. brucella* is such that the clinical community warns against misdiagnosis of one pathogen for the other (Dasari *et al* 2013, Thakur *et al* 2002).

Macroscopic bone changes can be similar for a variety of infectious processes. Thus, at the current time, further scientific analysis would be needed to identify the specific condition, if any, affecting these individuals.

8.11.3 Cribra Orbitalia

Cribra orbitalia is a condition in which porosity forms in the superior orbits as a result of the expansion of the diploe (Fg 8.81, Wapler *et al* 2004). The exact aetiology of this formation is debated; however, it has been linked to vitamin B12 deficiency and megaloblastic and haemolytic anaemia (Walker *et al* 2009). It has also been linked to progressive malaria (Gowland and Western 2012).

Differential preservation of the frontal bone resulted in a limited number of orbits available; and therefore, a thorough statistical analysis was not possible. Figures 8.82 and 8.83 show the number of individuals with cribra orbitalia by sex and by age group.

Figure 8.81, Left Orbit of Westness 19 Showing Cribra Orbitalia (Author's Image).

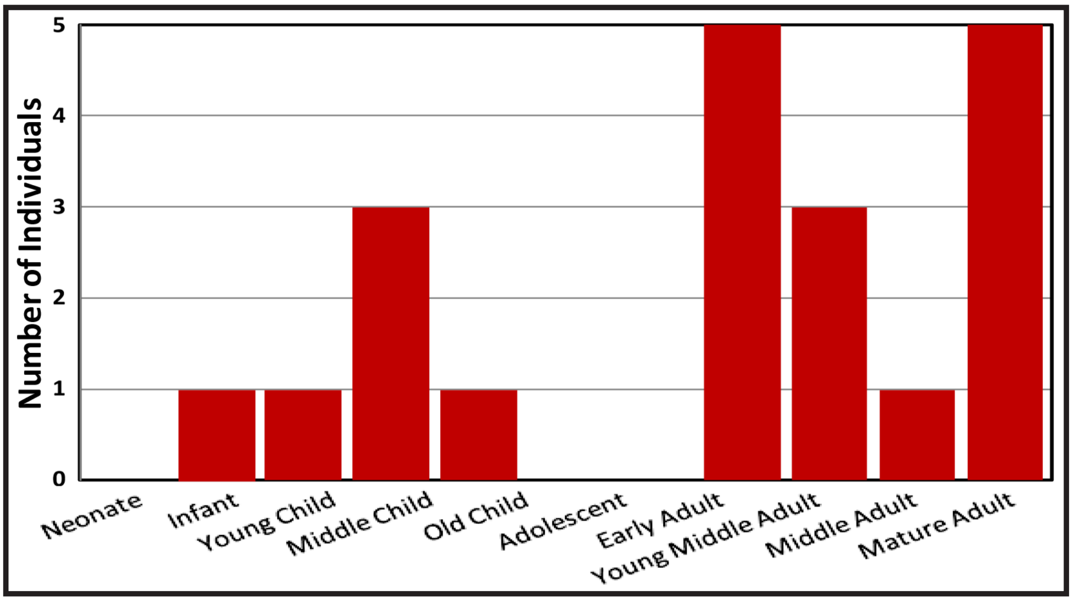

Figure 8.82, Number of Individuals with Cribra Orbitalia by Age.

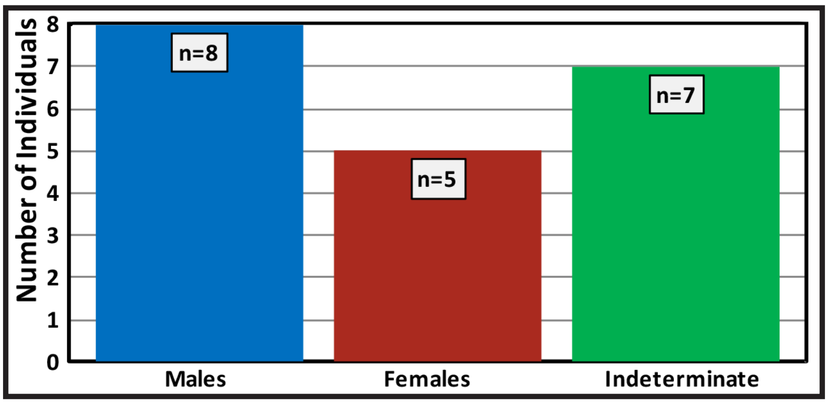

Figure 8.83, Number of Individuals with Cribra Orbitalia by Sex.

8.11.4 Rickets and Scurvy

Vitamin C deficiency causes a dysfunction in the body's cartilage and soft tissues, allowing blood to leak out of the haemopoetic vessels and out of the body. This condition is commonly known as scurvy. The blood connecting with bone that is normally prevented from touching, acts as an irritant, causing a prolific growth reaction of the bone (Fg 8.84, Brickley and Ives 2006, Ortner and Ericksen 1997). While any haematoma can cause this same bone proliferation (Clemetson 2004), certain areas of the body have more porous tissues and these are the first to begin leaking when scurvy acts the catalyst: the orbits, the gums, and the soft tissues of the cranium. Therefore, the presence of bone proliferation in these areas can indicate an active case of scurvy.

Figure 8.84, New Bone Growth on Crania of SK21b from John o' Groats (Author's Image).

Vitamin D deficiency causes a dysfunction in the formation of osteoid, causing a lower ratio of hard to soft tissue in the bones (Waldron 2009: 127-9). Bones then become soft and more pliable than if they were healthy and can bend under the weight of the body. This condition is commonly known as rickets in juveniles (Ortner and Mays 1998) and residual rickets in adults (Brickley *et al* 2010). In the young, skeletal manifestations often occur as bowing of the longbones, porosity and thinning of bones—particularly in the cranium and at the end of longbones—along with flaring of epiphyseal ends. In the very young, particularly pre-walking age, a flaring and porous destruction of the rib ends and metaphyses can occur (Fg 8.85).

Figure 8.85,

Rib Flaring on SK9 from St. Ninian's Isle (Author's Image).

Several juveniles in the assemblage presented osteological bone changes consistent with the metabolic conditions known as scurvy and rickets. These changes varied by individual and included porosity, bone proliferation, and rib-end flaring. Table 8.36 lists the individuals who presented with the pathologies listed above, along with their differential diagnoses.

It is important to note that, particularly in young children, the body often forms a reactive response to microscopic invasion and it can be difficult to ascertain the source of any given bone change. Many conditions and diseases can have osteological manifestations comparable to those in scurvy and in rickets: teething (Melikian and Waldron 2003), infection and anaemia (Ortner and Ericksen 1997), meningitis (Hershkovitz *et al* 2002), and so forth. One must also remember that conditions can exist in tandem, and considering both rickets and scurvy are vitamin deficiencies, it is entirely possible for and individual to be afflicted with both (Ortner and Ericksen 1997). In addition, the potential diagnosis of trauma induced haematoma, as from abuse or accident must also be considered (Clemetson 2004, Kaissi *et al* 2009, Ross and Juarez 2016). Thus, a differential diagnosis of rickets or scurvy must be given with caution.

Site	Individual	Age	Location	Appearance	Condition
Captain's Cabin	30	Infant	Endocranium and orbital vaults.	Layering of porous new bone.	Scurvy
John o' Groats	7a	Neonate	Endo and exocranium and longbone diaphyses.	Flaky layer of new bone.	Scurvy
	12	Infant	Endo and exocranium.	Plaque-like bone growth and porosity.	Scurvy
	21b	Neonate	Orbits and maxilla.	New woven bone growth.	Scurvy
St. Ninian's Isle	6	Neonate	Rib ends.	Flaring and lacy bone.	Rickets
			Tooth crypts.	Lacy bone destruction.	
	7	Young Child	Endocranium, anterior palate, visceral rib surface.	New bone growth.	Scurvy
			Eight of the lower vertebral bodies.	HVVI.	
	8	Neonate	Ectocranium.	Porous new bone deposits.	Scurvy
	9	Young Child	Endocranial surface around crucifom eminence and tooth crypts.	Lacy bone destruction.	Rickets
			Rib ends.	Flaring.	
			Vertebral bodies.	Some HVVI.	
	11	Neonate	Endocrainial surface of the sphenoid and surrounding the alveolus.	New bone growth.	Healing rickets or possible mix of conditions.
			Rib ends.	Flaring.	
	12	Neonate	Endocranial surface of the parietal.	New bone growth.	Healing rickets or possible mix of conditions.
			Rib ends.	Flaring.	
	13	Neonate	Endocranial occiput and orbits.	New bone growth.	Scurvy
Westness	17	Infant	Endo and Ectocranium.	Porous new bone growth.	Scurvy

Table 8.36, Individuals with Indicators of Rickets and Scurvy. Diagnoses are Provisional.

8.11.5 Spina Bifida

Spina bifida results from a fusion failure in the vertebral lamina and can expose the spinal cord (Waldron 2009: 219). When this occurs in the sacrum, the cartilaginous layers often act to ‘seal’ the opening and thus the cauda equina remains protected. This is commonly known as spina bifida occulta. In the majority of cases the condition is either asymptomatic or have minimal symptoms (Verhoef *et al* 2007, Waldron 2009: 219). Preservation prohibited a robust statistical analysis of spina bifida occulta within the research population. Table 8.37 lists the individuals who exhibited this condition.

Site	Individual	Age	Sex
Balnakeil	1	Old Child	Indeterminate
Breckness	1	Adult	Male
	2	Early Adult	Male
Bu of Cairston	9	Young Middle Adult	Indeterminate
Carlisle	14 Associated	Adult	Indeterminate
Captian’s Cabin	19	Adolescent	Indeterminate
	62	Middle Adult	Male
	72	Mature Adult	Male
Newark	68_8	Mature Adult	Female
	68_32	Adult	Indeterminate
St. Ninian’s Bute	1	Mature Adult	Female
St. Ninian’s Isle	3	Early Adult	Male
	Robert	Old Child	Indeterminate
Scar	134	Middle Adult	Male
Westness	14	Adult	Female

Table 8.37, Individuals with Spina Bifida Occulta.

8.12 Dentition

Dental pathologies were recorded as outlined in Section 5.3.9. These included calculus, caries, enamel hypoplasia, abscesses, granulomata, wear, periodontal disease, and antemortem tooth loss (Table 8.38).

Pathology prevalence generally compares between the sexes (Fg 8.86). Chi^2 tests confirm none of the differences are statistically significant (Table 8.39).

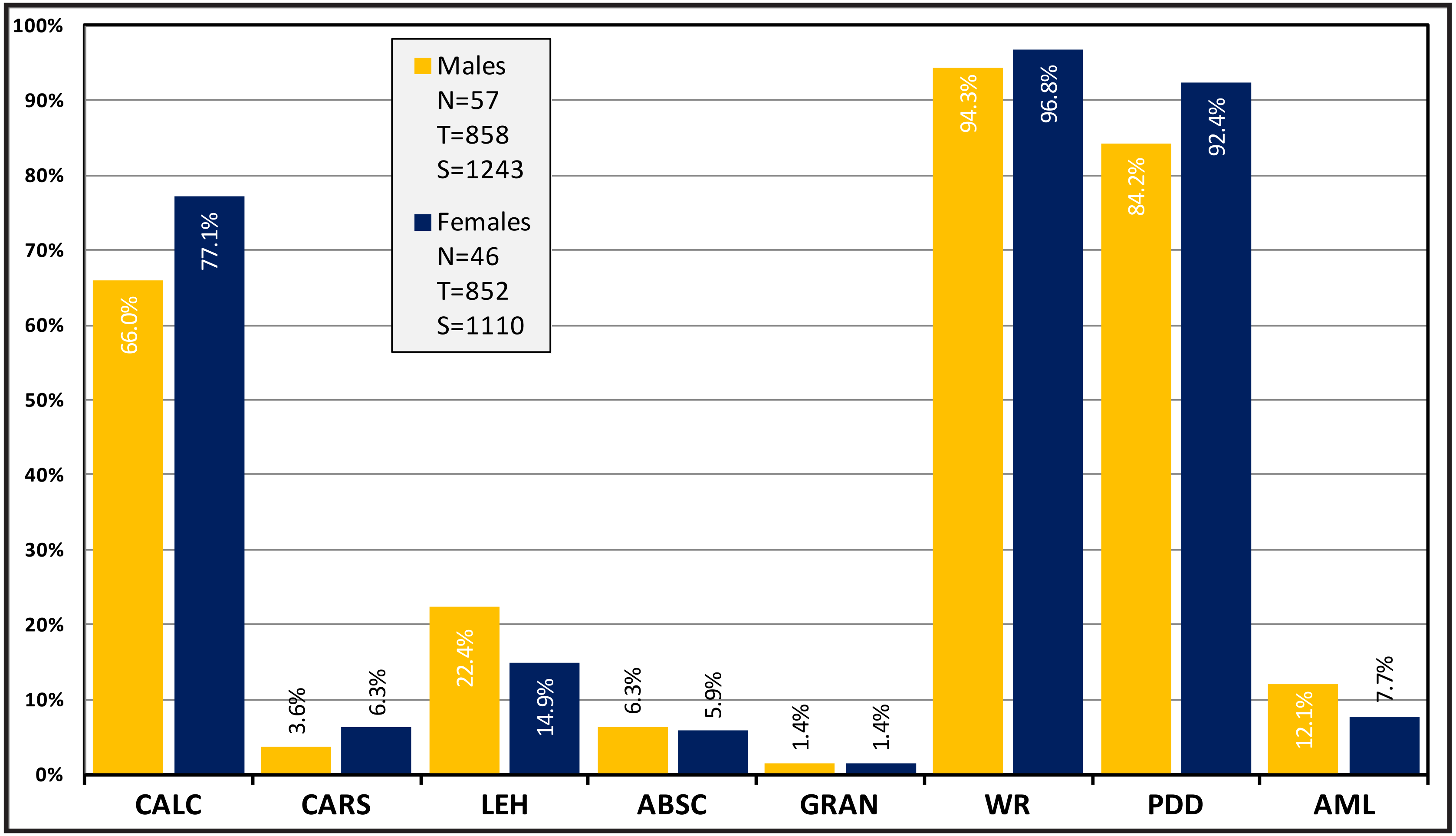

Figure 8.86, Histogram of Dental Pathology by Sex. See Table 8.38 for Key to Abbreviations.

Age shows little visible correlation to dental pathology except with hypoplasia (Fg 8.87). Chi^2 tests confirm that this difference is statistically significant (Table 8.40). A chi^2 test also suggests that there is a significant difference in antemortem tooth loss; however, this is most likely due to no tooth loss in the early adult age category. A chi^2 test performed without the early adults confirms that there is no difference between the remaining ages: p=0.788, X^2=1.055, df=3.

Abbr	Meaning
N	Total number of individuals
T	Total number of teeth
S	Total number of sockets
CALC	Calculus
CARS	Caries
LEH	Enamel hypoplasia
ABSC	Abscess
GRAN	Granuloma
WR	Wear
PDD	Periodontal disease
AML	Antemortem tooth loss

Table 8.38,
Key to Abbreviations in Section 8.12.

Pathology	Chi^2	DF	P-Value
CALC	0.861	1	0.353
CARS	0.736	1	0.391
LEH	1.580	1	0.219
ABSC	0.013	1	0.909
GRAN	0.001	1	1.00
WR	0.033	1	0.856
PDD	0.381	1	0.537
AML	0.918	1	0.323

Table 8.39, Chi^2 Test Results for Dental Pathology between Males and Females.

HGLM tests were performed on the prevalence data for each pathology type by groups: religion, ethnicity, and site type, with age and sex as factors (Fgs 8.88 to 8.90).

HGLM results for calculus found no factors key for any of the groups save site type. This proved to be the only factor important in the separation of groups, even with sex and age as potential factors. ANOVA results show this is statistically significant (Table 8.41).

HGLM tests for caries rates found no key factors in group separation.

Tests for the prevalence of hypoplasia show that age is the primary factor in the separation by religion, ethnicity or site type (Tables 8.42 to 8.44). In all cases this is a statistically

Pathology	Chi^2	DF	P-Value
CALC	0.97	4	0.53
CARS	4.201	4	0.38
LEH	29.954	4	0.00001
ABSC	2.998	4	0.558
GRAN	3.711	4	0.446
WR	0.389	4	0.983
PDD	3.309	4	0.508
AML	11.844	4	0.019

Table 8.40, Chi^2 Test Results for Dental Pathology by Age Groups.

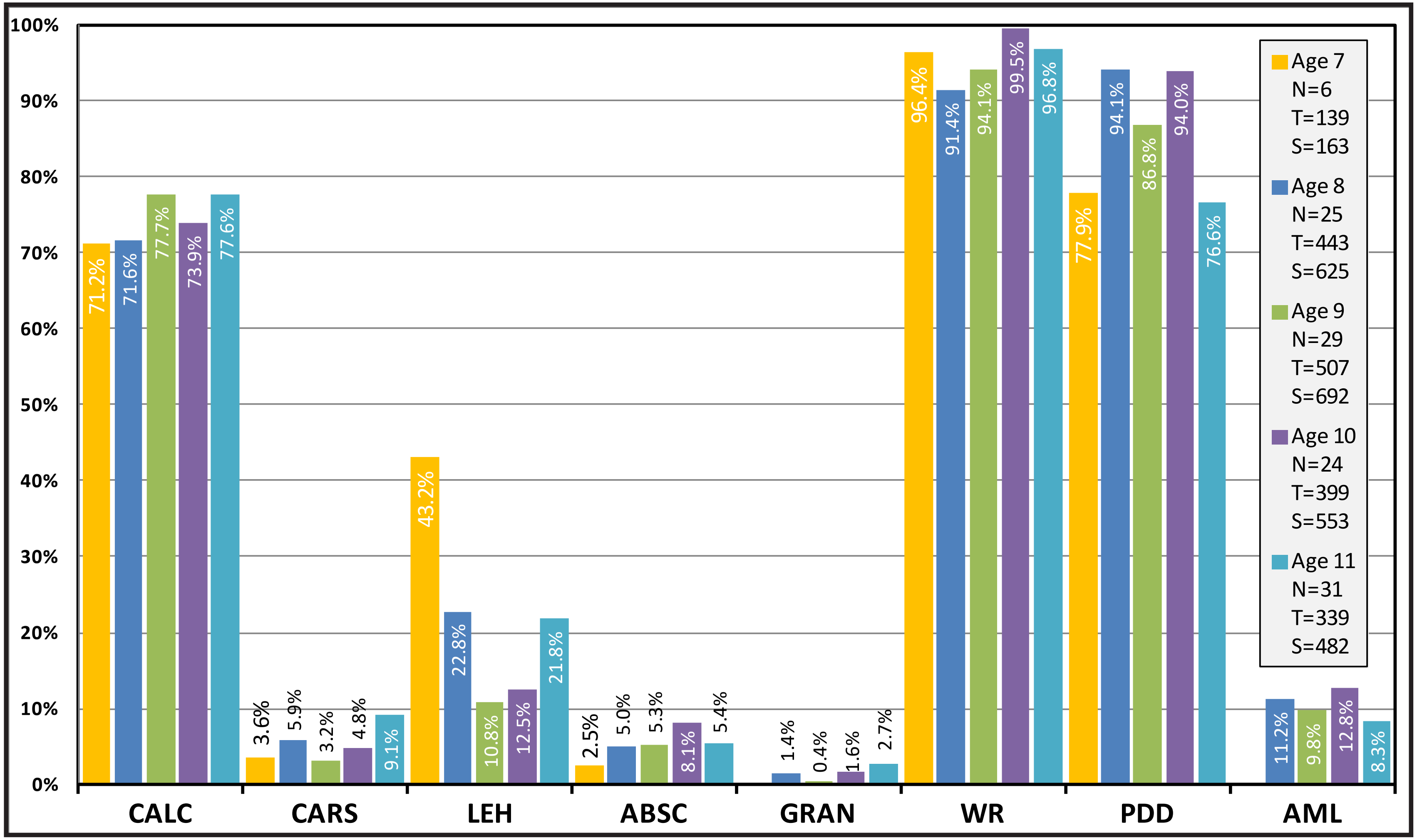

Figure 8.87, Histogram of Dental Pathology by Age. See Table 8.38 for Key to Abbreviations.

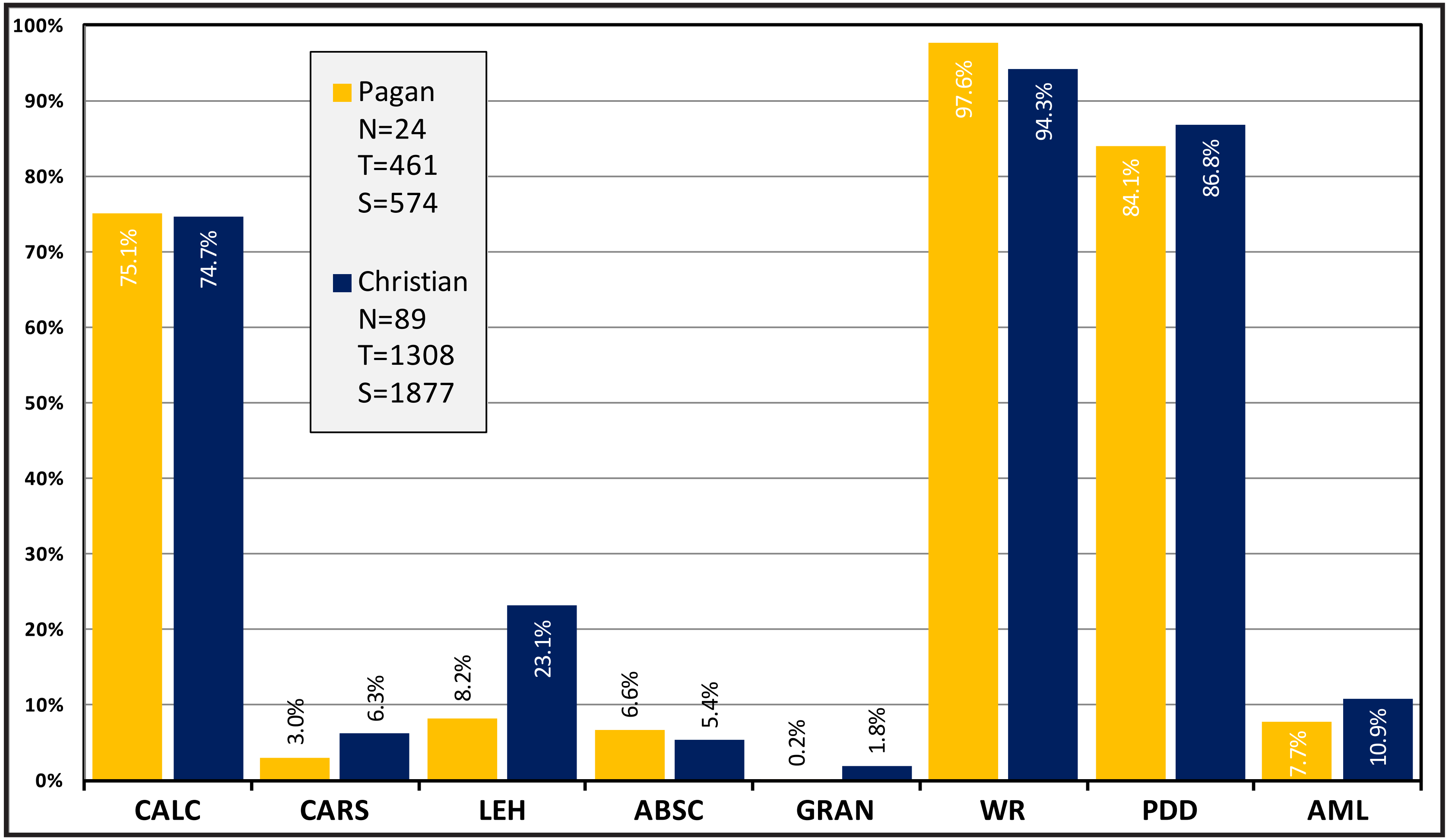

Figure 8.88, Histogram of Dental Pathology by Religion. See Table 8.38 for Key to Abbreviations.

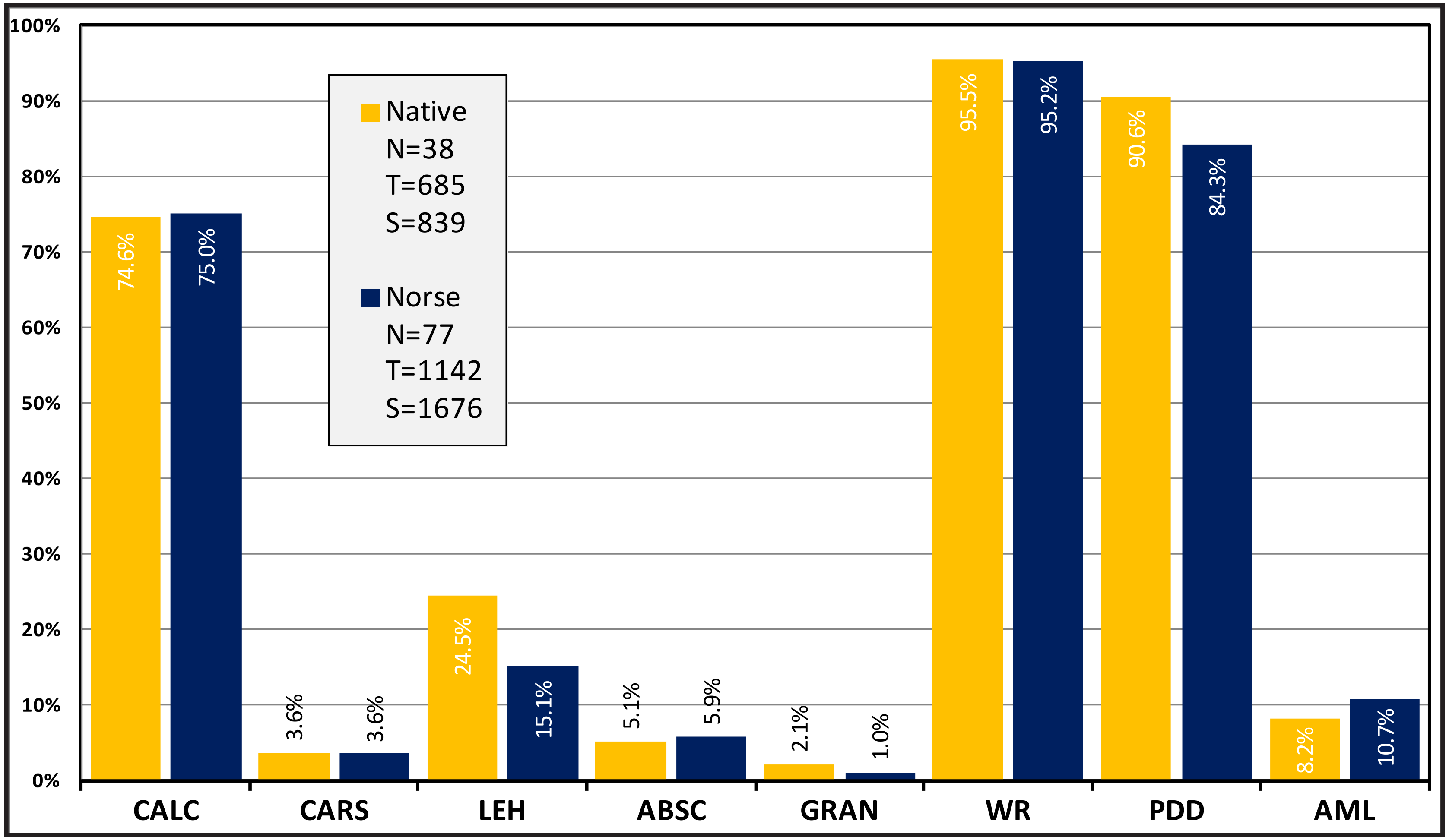

Figure 8.89, Histogram of Dental Pathology by Ethnicity. See Table 8.38 for Key to Abbreviations.

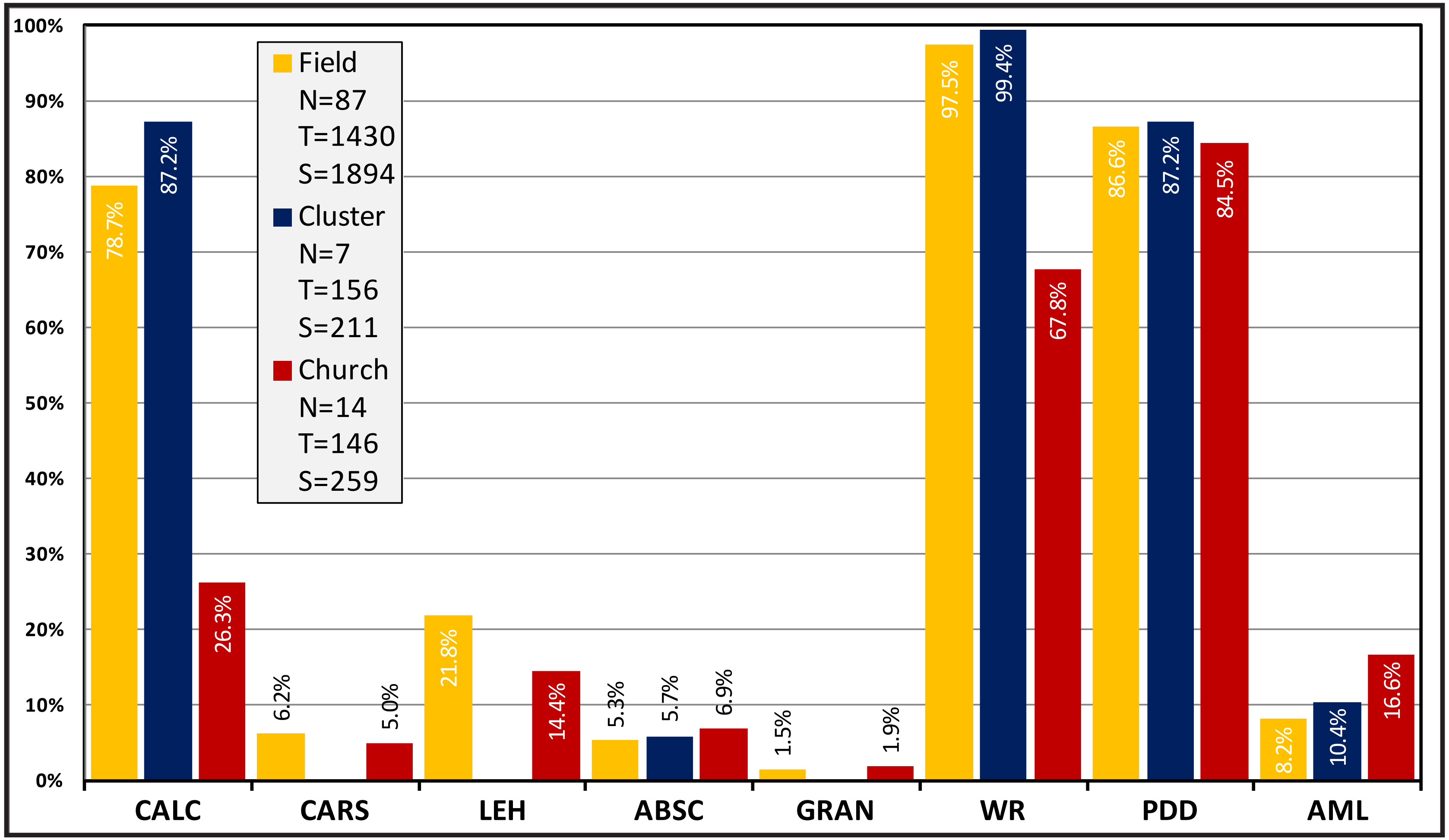

Figure 8.90, Histogram of Dental Pathology by Site Type. See Table 8.38 for Key to Abbreviations.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter=0.15, α to remove=0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Type	4	1.635	18.01%	1.635	0.40874	5.27	0.001
Error	96	7.445	81.99%	7.445	0.07755		
Lack-of-Fit	22	2.335	25.72%	2.35	0.10614	1.54	0.088
Pure Error	74	5.110	56.28%	5.110	0.06905		
Total	100	9.080	100.00%				

Table 8.41, ANOVA Results from an HGLM for Calculus by Site Type.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	5	0.8055	15.98%	0.6664	0.13327	3.06	0.013
Religion	1	0.2344	4.65%	0.2344	0.23435	5.39	0.022
Error	92	4.0011	79.37%	4.0011	0.04349		
Lack-of-Fit	12	0.8300	16.47%	0.8300	0.06917	1.74	0.073
Pure Error	80	3.1711	62.91%	3.1711	0.03964		
Total	98	5.0409	100.00%				

Table 8.42, ANOVA Results from an HGLM for Hypoplasia by Religion.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	5	0.8495	16.65%	0.8495	0.16990	3.79	0.004
Error	95	4.2539	83.35%	4.2539	0.04478		
Lack-of-Fit	14	0.9731	19.07%	0.9731	0.06951	1.72	0.068
Pure Error	81	3.2808	64.29%	3.2808	0.04050		
Total	100	5.1034	100.00%				

Table 8.43, ANOVA Results from an HGLM for Hypoplasia by Ethnicity.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	5	0.8495	16.65%	0.6846	0.13693	3.15	0.011
Type	4	0.3038	5.95%	0.3038	0.07594	1.75	0.146
Error	91	3.9502	77.40%	3.9502	0.04341		
Lack-of-Fit	17	0.5323	10.43%	0.5323	0.03131	0.68	0.814
Pure Error	74	3.4178	66.97%	3.4178	0.04619		
Total	100	5.1034	100.00%				

Table 8.44, ANOVA Results from an HGLM for Hypoplasia by Type.

significant difference. Ethnicity is not a key factor in group separation; however, religion is key and has produced a significant result. Site type is also a key factor, yet the difference is not statistically significant.

For abscesses, neither sex nor age are key to population division. It is the group categories themselves which are key to division: religion and site type providing statistically significant ANOVA results (Tables 8.45 to 8.47).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Religion	1	0.4386	6.11%	0.4386	0.43865	6.45	0.013
Error	99	6.7378	93.89%	6.7378	0.06806		
Lack-of-Fit	17	1.0278	14.32%	1.0278	0.06046	0.87	0.612
Pure Error	82	5.7100	79.57%	5.7100	0.06963		
Total	100	7.1765	100.00%				

Table 8.45, ANOVA Results from an HGLM for Abscesses by Religion.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Ethnicity	1	0.2004	2.75%	0.2004	0.20044	2.85	0.094
Error	101	7.0924	97.25%	7.0924	0.07022		
Lack-of-Fit	18	1.0376	14.23%	1.0376	0.05764	0.79	0.706
Pure Error	83	6.0548	83.02%	6.0548	0.07295		
Total	102	7.29.28	100.00%				

Table 8.46, ANOVA Results from an HGLM for Abscesses by Ethnicity.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Type	4	1.647	22.58%	1.647	0.41165	7.14	0.001
Error	98	5.646	77.42%	5.646	0.05761		
Lack-of-Fit	24	1.787	24.50%	1.787	0.07446	1.43	0.124
Pure Error	74	3.859	52.92%	3.859	0.05215		
Total	100	7.293	100.00%				

Table 8.47, ANOVA Results from an HGLM for Abscesses by Type.

Age is the key factor in the separation of granulomata prevalence for religion, ethnicity, and site type (Tables 8.48 to 8.50).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	5	0.6785	51.03%	0.6785	0.135701	19.80	0.001
Error	95	0.6511	48.97%	0.6511	0.006854		
Lack-of-Fit	13	0.1074	8.07%	0.1074	0.008259	1.25	0.264
Pure Error	82	0.5437	40.90%	0.5437	0.006631		
Total	100	1.3296	100.00%				

Table 8.48, ANOVA Results from an HGLM for Granulomata by Religion.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	5	0.67814	50.81%	0.67814	0.135628	20.04	0.001
Error	97	0.65642	49.97%	0.65642	0.006767		
Lack-of-Fit	14	0.08285	6.21%	0.08285	0.005918	0.86	0.607
Pure Error	83	0.57357	42.98%	0.57357	0.006910		
Total	102	1.33456	100.00%				

Table 8.49, ANOVA Results from an HGLM for Granulomata by Ethnicity.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Age	5	0.67814	50.81%	0.67814	0.135628	20.04	0.001
Error	97	0.65642	49.19%	0.65642	0.006767		
Lack-of-Fit	23	0.09805	7.35%	0.09805	0.004263	0.56	0.938
Pure Error	74	0.55837	41.84%	0.55837	0.007546		
Total	102	1.33456	100.00%				

Table 8.50, ANOVA Results from an HGLM for Granulomata by Site Type.

Wear also showed no factors important for separation of groups. It may, however, be prudent to note here that this is a measure of prevalence and not severity. A measure of severity may provide different results.

HGLM tests show sex and then age as key factors in group separation for periodontal disease rates (Tables 8.51 to 8.53). Religion is the only group which is also a key factor. This division is of statistical significance.

Site type is the only significant factor in the separation of groups when HGLM tests are run for antemortem tooth loss. There is also a statistically significant difference between the site types (Table 8.54).

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	0.3014	4.37%	0.2816	0.28158	4.64	0.034
Age	5	0.6853	9.94%	0.7091	0.14181	2.33	0.048
Religion	1	0.2600	3.77%	0.2600	0.25995	4.28	0.041
Error	93	5.6483	81.92%	5.6483	0.06073		
Lack-of-Fit	11	1.4180	20.46%	1.4180	0.12825	2.48	0.010
Pure Error	82	4.2376	61.48%	4.2376	0.05168		
Total	100	6.8950	100.00%				

Table 8.51, ANOVA Results from an HGLM for Periodontal Disease by Religion.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	0.2885	4.16%	0.2257	0.22574	3.65	0.059
Age	5	0.7060	10.18%	0.7060	0.14120	2.28	0.052
Error	96	5.9403	85.66%	5.9403	0.06188		
Lack-of-Fit	13	0.4688	6.76%	0.4688	0.03606	0.55	0.888
Pure Error	83	5.4714	78.90%	5.4714	0.06592		
Total	102	6.9347	100.00%				

Table 8.52, ANOVA Results from an HGLM for Periodontal Disease by Ethnicity.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Sex	1	0.2885	4.16%	0.2257	0.22574	3.65	0.059
Age	5	0.7060	10.18%	0.7060	0.14120	2.28	0.052
Error	96	5.9403	85.66%	5.9403	0.06188		
Lack-of-Fit	22	0.9762	14.08%	0.9762	0.04437	0.66	0.862
Pure Error	74	4.9640	71.58%	4.9640	0.06708		
Total	102	6.9347	100.00%				

Table 8.53, ANOVA Results from an HGLM for Periodontal Disease by Site Type.

Factor coding -1, 0, +1	Stepwise Selection of Terms: α to enter =0.15, α to remove =0.15						
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Type	4	0.3378	13.09%	0.3378	0.08444	3.639	0.008
Error	98	2.2434	86.91%	2.2434	0.02289		
Lack-of-Fit	24	0.8954	34.69%	0.8954	0.03731	2.05	0.010
Pure Error	74	1.3480	52.22%	1.3480	0.01822		
Total	102	2.5811	100.00%				

Table 8.54, ANOVA Results from an HGLM for Antemortem Tooth Loss by Site Type.

8.12.1 Discussion of the Results Dentition Analysis

Age and sex are factors which commonly correspond to the degeneration of the body. However, these factors seem to play a varied part in the pattern of dental degeneration. For instance, no significance was detected between males and females in the group as a whole, and sex was a decisive factor solely in the case of periodontal disease; although, the only true statistically significant difference was produced in religion, not in ethnicity or site type analyses. This may suggest that males and females either ate different types of food, had different methods of dental hygiene, or both. Further investigation is needed to determine the validity of this suggestion.

Age is the second factor for group variation in periodontal disease and again the only true statistically significant difference showed in the analysis of religion. The significance of this is unclear. Figure 8.87 does not show a steady increase or decrease with age. It does indicate a different rate for each age group; however, the ambiguous 'adult' age group is included in this calculation and, if the age of these individuals could be more accurately established, an entirely different result may be produced.

Age is also the one and only key factor in the separation of groups in granulomata and hypoplasia analyses. Granulomata rates are low to begin with, which begs the question as to how much difference there can truly be. Chi^2 results, in fact, suggest there is no appreciable difference between the age groups ($p=0.446$, $X^2=3.711$, $df=4$). A similar situation presents for periodontal disease in the 'adult' group. In this case, the catch-all, 'adult' group produces the highest rate of granulomata. This group could significantly alter the HGLM results, should more accurate ages be established for these individuals.

Hypoplasia rates, however, do seem to suggest a not unreasonable connection to age, even in with the inclusion of the catch-all 'adult' group. The highest rate of hypoplasia is in the youngest age, early adult, followed by the young middle adult group. There is considerable evidence to suggest that high levels of stress in childhood not only contribute to ill health in adulthood but also an earlier age at death: the Barker hypothesis (Armelagos *et al* 2009, Cook and Buikstra 1979, King *et al* 2005). Enamel hypoplasia is a direct indicator of childhood stress, and therefore, the highest prevalence rate seen in the youngest group, with the next youngest group in second place, does adhere to this premise.

At this point, it seems important to reiterate that these tests have all been on prevalence rates and not on rates of severity or location. If tests could be preformed with these factors in mind, a variation in age and(or) sex may be revealed.

Dental analyses do show a compelling separation between many of the test groups. Religion was a main factor in the classification of abscesses, periodontal disease, and hypoplasia. This suggests a difference in dental hygiene or dental care between the 'pagan' and 'Christian' groups. This also suggests a higher rate of childhood stress in the 'Christian' group than for the 'pagan' (Fg 8.88). What specifically caused these differences is currently unknown.

Site type proved to be a main factor in the classification of calculus, antemortem tooth loss, abscesses, and hypoplasia (Fg 8.90). The church sites demonstrated a rate of calculus one third or less the rate of the field or cluster sites (78.7% field, 87.2% cluster, 26.3% church), yet the church sites also produced the highest rate of antemortem tooth loss, 16.6%: more than twice that of the field sites, 8.2%, and almost matching that doubled rate in the cluster, 10.4%. Dental calculus has been linked to the consumption of protein based foods (Lieverse 1999), and this could be an indication that those in the church site group consumed a lower level of proteins in their diet.

The aetiology behind the antemortem tooth loss is much less decipherable at this time. Antemortem tooth loss can result from many antecedents: trauma, severe periodontal disease, untreated abscesses, severe caries or attrition, and systemic diseases, such as scurvy or leprosy (Hillson 2005: 111-17. Hillson 1996: 254-87). It is therefore unclear as to why the various site types have significantly different AML rates.

Site groups also show a significant difference in rates of dental hypoplasia, 21.8% field, 0.0% cluster, and 14.4% church. This indicates that the highest childhood stress occurred in the field sites with no childhood stress seen in the cluster sites. Additional testing, such as isotope extraction or possibly microscopy, may shed light on the specific stressors which caused the dental hypoplasia. Further information on or usage of age at death may also help clarify the differences in hypoplasia rates, particularly in light of the low number of individuals in the cluster grouping.

In a way, the most compelling dental results have come from the analyses of abscesses. This is mainly because the factor analyses (Tables 8.45 to 8.47) have indicated significant (or near significant) variations that are *not* apparent in the histograms (Fgs 8.88 to 8.90). Both religion and site type are factors in the separation of groups, and these group differences are statistically significant (religion p=0.013, site type p=0.001). This is also the sole area in which ethnicity played a role in group division; although, this is the instance which was only ‘near’ statistically significant (p=0.094). What, precisely, this means is unclear. Further investigation would be needed to offer an explanation for these results.

8.13 Individual Cases

Identity is about individuals as much as about groups. During the process of analysis, several individuals stood out from the rest. The subsequent sections will give a brief accounting of those individuals.

8.13.1 Captain’s Cabin 53b

Individual 53b from Captain’s Cabin was a skeletal female in the young middle adult category. Stature was calculated from the left humerus as 157.8 ± 4.45cm (5ft 1.6in ± 1.74in). Specific information as per the grave environment was not available. Preservation was such that many of the long bones, including the lower limbs, were absent. Several of the remaining bones were fragmented and the cortical bone was damaged.

Apart from the left capitate and part of the right trapezoid, the carpals for both hands were missing (Fg 8.91). The proximal and distal ends of the right metacarpals and phalanges had been lost. The remaining right manual bones evidenced thinning of the cortical bone and general bone wasting. The second metacarpal had fused to the extant trapezoid on the palmar side.

Figure 8.91, Manual Bones from Captain’s Cabin 53b (Author’s Image).

Unfortunately, due to the fragmentation and missing elements, it is unclear whether these bone changes were due to a fracture or a congenital

Figure 8.92, The Forearm Bones from Captain's Cabin 53b (Author's Image).

malformation. The forearm bones (right ulna missing) do seem to noticeably bow, diaphyses laterally and distal ends medially to the limb axis (Fg 8.92). This feature was very difficult to photograph and is not as overt in the photo as it was in vivo. The cortical bone was thin and the bones relatively light; although the delicacy of the bones could easily be taphonomic and not biological. However, the cortical bone was thin and this is not affected by taphonomy. Bone robusticity, especially cortical bone, is affected by usage; and this is particularly the case in terms of usage in the young age groups with a continuation into the later stages of life (Pearson and Lieberman 2004). To clarify, the more a bone is used, the more robust it will become. When this occurs in childhood, there is a greater likelihood that this robusticity will carry on into old age (albeit with some waning depending on the amount of age related degeneration). Usage in adulthood will also affect robusticity; however, it is much less likely to create the amount of robusticity which is possible from usage in childhood.

Captain's Cabin 53b was assessed as middle adult and yet the thinness of the cortical bone was that which would be expected in an individual in the mature adult group. Although, there are many factors which can affect bone robusticity, the evidence is suggestive that the condition of the hand began in childhood, influencing the usage of the upper arms and affecting the development of the bone robusticity.

8.13.2 Cnip D

Individual D from Cnip had been placed in a dug grave in the sand (Dunwell *et al* 1995). The male skeleton lay supine and extended in a general north-south alignment, with no trace of grave good inclusions (Fg 6.50). The surface of the grave had been marked with undressed stones.

Figure 8.93, Concha Bullosa in Cnip D (Author's Image).

Individual D was a robust, young middle adult male, with a stature estimation of 161.3 ± 3.94cm (5ft 3.5in ± 1.55in). Skeletal analysis revealed the presence of ossified thyroid and cricoid cartilage. His left nasal passage exhibited concha bullosa (Fg 8.93), a condition which appeared benign in this individual; however, it can lead to further inflammatory disease (Hatipoğlu *et al* 2005, Lidov and Som 1990).

The right lower first molar was broken on the lingual side (Fg 8.94). His anterior maxillary dentition had been lost ante-mortem. The alveolar surface had not completely healed and the tooth crypts were still evident. The teeth had, however, been absent long enough for the corresponding mandibular teeth to have inclined anteriorly (Fg 8.95). Calculus deposition was heavy, especially on the labial side, implying this surface was not being used. Bruce (1995) suggests these teeth were lost due to trauma. It is possible that the anterior teeth were lost in

Figure 8.94, Broken Right 1st Molar in Cnip D (Author's Image).

Figure 8.95, Profile of Cnip D (Author's Image).

the same instance that caused the molar fracturing; however, there was no obvious indication that trauma was the cause of the missing anterior teeth. Additionally, the fractured pieces of the first molar remained in the tooth crypt and had smooth edges, suggesting this fracture was not recent, while the anterior alveolus was still in the process of healing. The molar crypt had also expanded and appears to have abscessed on the buccal and occlusal surfaces.

Figure 8.96, Spinus Process of the 4th Thoracic Vertebra of Cnip D (Author's Image).

The spinous process of the 4th thoracic vertebra appeared to have an avulsion fracture that has healed with a slight deviation to the right (Fg 8.96). The spinous process of the 4th thoracic vertebrae is the attachment for a part of the rhomboideus major and the part of the lower fibres of the trapezius (Gray 2000, Kingston 2005). These muscles control the movement of the shoulder, and this portion particularly controls the scapula. An hyper- or hypo-extension of the scapula by trauma or repetitive stress is the most common cause of a spinous process fracture (Feldman and Astri 2001, Kang and Lee 2009).

The 5th lumbar vertebra exhibited spondylolysis of the dorsal lamina (Fg 8.97). Spondylolysis is considered fracture of the neural arch (Pinhasi and Mays 2007, Waldron 2009). This occurs either as a traumatic instance or as a fatigue fracture due to continual hyper-flexion of the lumbar curve (Fredrickson 1984, Ward and Latimer 2005). However, if these forces are evident in the

Figure 8.97, Spondylolysis of the 5th Lumbar in Cnip D (Author's Image).

unfused vertebra of a juvenile, it is possible for the pars interarticularis to develop facet articulation in order to maintain biomechanical mobility in this area (Graßhoff *et al* 2002, Hasler and Dick 2002, Kainberger 2006).

Cnip D also exhibited bilateral os acromiale in both scapulae (8.98). As with spondylolysis, the acromial process begins development with a separate ossification centre at the tip. Fusion can fail for a variety of reasons, including: genetics, repetitive usage, trauma, and infection, among others (Case *et al* 2006, McGahan *et al* 1980, Waldron 2009, Zuckerman *et al* 1993). In this case, the similar appearance of the feature on both sides suggests that this instance of os acromiale is due to a fusion failure, rather than traumatic instance.

Figure 8.98, Os Acromiale in Cnip D (Author's Image).

The right humeral head possessed a depression in the cortical surface approximately 1cm wide and 2.5cm long (Fg 8.99). The depression had no perforation into the trabeculae and appears to have been a healed instance of osteochondritis dissecans, a traumatic fracture which detached a portion of the cortical bone (Waldron 2009). No corresponding lesion was evident on the glenoid surface.

Figure 8.99, Healed Lesion in the Humeral Head of Cnip D (Author's Image).

The right innominate displayed signs of a well healed trauma to the anterior superior spine of the iliac crest (Fg 8.100). A fracture in this area is rare and seems to most commonly occur in runners and track and field athletes in their late teens (Christopher 1933, Khoury *et a*l 1985, Mooney 1937, Naylor *et al* 2013). However, the fracture in runners is of the avulsion type and normally detaches only a small piece of bone. The fracture in the innominate of Cnip D seems to have detached a larger portion of bone than in the avulsion type. In light of the also well healed damage to the humerus, on the same side, it would suggest a traumatic incident at some time in the past as the cause of these injuries.

Figure 8.100, Healed Fracture to the Ilium of Cnip D (Author's Image).

8.13.3 St. Ninian's Isle 5

Individual 5 from St. Ninian's Isle was a young middle adult male with an estimated stature of 166.6 ± 4.0cm (5ft 5.08in ± 1.56in). He had been deposited in a short cist and aligned west-east (Barrowman 2011). His torso lay supine; however, it was apparent that he had been in a semi-articulated state when interred (Fg 8.101). His lower legs had been placed alongside

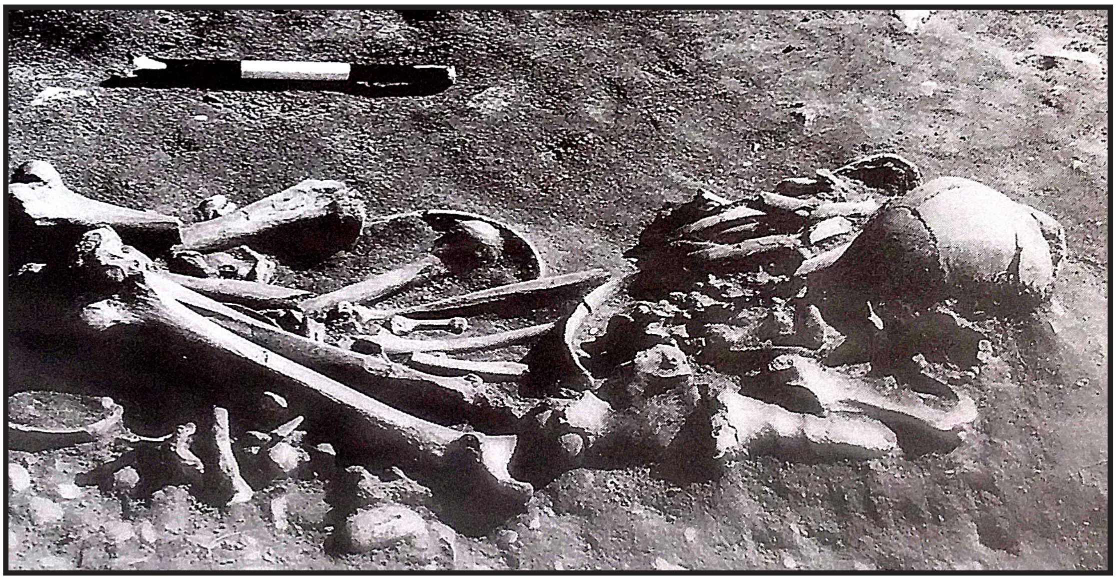

Figure 8.101, Individual 5 from St. Ninian's Isle in Situ (Modified from Barrowman 2011: 97).

the femora and one humerus lay just to the right of the legs. His cranium had been placed on the top of his chest, and his mandible lay to the left along side both scapulae. An iron knife was included alongside the body.

Analysis revealed perimortem trauma which most likely resulted in his death. His lower left leg had a perimortem sharp force trauma which had severed the fibula and cut into the tibia (Fg 8.102). The posterior cranium also had a perimortem wound from a sharp object which displaced the parietal

Figure 8.102, Sharp Force Wound to Lower Leg in St. Ninian's Isle 5 (Author's Image).

from the vault (Fg 8.103). Lastly, Individual 5 had a severing sharp force trauma to his 3rd cervical vertebra (Fg 8.104).

Figure 8.103,

Sharp Force Wound to the Cranium of St. Ninian's Isle 5 (Author's Image).

Figure 8.104, Sharp Force Wound to the 3rd Cervical Vertebra of SK5 (Author's Image).

Wounds such as these are consistent with a hefty and sharp weapon such as a sword or an axe (Geber 2015, Kjellström 2005, Walsh-Haney 1999). It seems reasonable to suggest that the severing of the neck was the cause of death, with the laceration on the lower leg occurring just previous. As the body was at least partially disarticulated at the time of burial, it is possible that the attack occurred on Shetland at a time when burial was not immediately possible. The body could have been stored somewhere, possibly a temporary grave or chest, and then interred at St. Ninian's at a later date.

When the body was discovered during the excavation, speculation was that this was a 'native' who had been killed by a 'Viking' (Shetland Museums, Pers Comm). However, radiocarbon dated Individual 5 to 1025-1220AD (Fg 6.7, Barrowman 2011: 174), which is after the supposed date(s) which Norse settlement began (Hansen 2000). This is, however, the time of the 1st and 2nd Crusades (Lock 2006, Madden 2005), and it is possible this individual was killed in battle and then sent back to Shetland for burial (ie *mos teutonicus*, Section 3.4.3). Isotope analysis could give clues to answer this question.

8.13.4 St. Ninian's Isle, Hubert

'Hubert' was a robust male in the mature adult group with an estimated stature of 162.2cm ± 4.0cm (5ft 3.6in ± 1.56in). The Marischal records 'Hubert' as having been laid out in a cist with a cross slab at his feet (Barrowman 2011: 59-60, University of Aberdeen 2003a). 'Hubert's left mandibular condyle had some nodules of bone which appeared to have secondarily fused to the condylar surface (8.105). The superior

Figure 8.105, 'Hubert's Left Mandibular Condyle (Author's Image).

portion of the sternal corpus appears to have been broken and was in the process of healing (Fg 8.106).

Figure 8.106, Healing Sternal Fracture of 'Hubert' (Author's Image).

'Hubert' exhibited ligamentous ossification at several entheses: the popliteal line on the right tibia, both calcanei at the extensor digitorum brevis, and both femora at the attachment for the

Figure 8.107, Enthesophytes on the Femur of 'Hubert' (Author's Image).

Figure 8.108, Gouty Lesions in 'Hubert's' Feet (Author's Image).

glutæus minimus (Fg 8.107).

In addition, his third left metatarsal and both halluces exhibit erosive, smooth surfaced, yet sharp edged lesions which are consistent with the presentation of gout (Fg 8.108). In fact, 'Hubert' and ‘Rosemary’ are the only individuals in the entire assemblage with characteristics of gout.

Gouty lesions result from an increase in uric acid which the body cannot process (Fam 2002). The acid crystalises and settles in the joints, especially the metatarsophalangeal joint of the hallux and the elbow (Matsuo *et al* 2011, Rothschild and Heathcote 1995, Swinson *et al* 2008). Like DISH, gout has been linked to a rich diet (Fam 2002). Recent research has also revealed a complex process involving genetics and environment along with diet (Fam 2002, Matsuo *et al* 2011).

Lastly, ‘Hubert’ exhibited bilateral degeneration of the rotator cuff (Fg 8.109). Both humeral heads were porous with marginal osteophytosis. The bulk of the degeneration was on the anterior corpus surface. The right humerus also exhibited shiny eburnation. This same pathology was also present on the inferior surface of the acromion of both scapulae. This is not a normal area of artiulation. In a healthy individual, there are tendons which glide inbetween these surfaces and a bursal sac to protect the joint complex (Michener *et al* 2003, Roberts *et al* 2007). Miles (1996) suggests a sharp upward thrust of the humerus (like putting one’s hands out in a fall) might be enough to rupture the bursa, but only if there is already degeneration. There is no consensus as to the aetiology of this condition (Edelson 1995, Edelson

Figure 8.109, Erosion of Shoulder Joint in ‘Hubert’ (Author’s Image).

and Taitz 1992, Kerr *et al* 1985, Michener *et al* 2003, Prescher *et al* 2000). However, there is a biomechanical component to the presentation of the condition. Hubert's pathology was such that it would most logically have been created from continuous or constant over extension of the arms.

Radiocarbon dates 'Hubert' to 680-875 AD (Barrowman 2011: 174). This date is unhelpful in posing a reasonable scenario as to how Hubert came to have these various pathologies. The date spans the Pictish and Norse periods making him as likely to be a 'native' monk as a 'Norse' warrior (not to imply that there were no 'native' warriors or 'Norse' monks). His bones and muscle attachments were robust, implying he was well fed, healthy, and active. This is supported by the presence of gout, suggesting his access to rich foods. His wounds also suggest he was in a situation allowing him time and care to heal.

8.13.5 Westness 5

Individual 5 from Westness was a middle adult female with an estimated stature of 150.4cm ± 4.45cm (4ft 10.75in ± 1.74in) from right humerus. She had been placed in an oval earthen grave, aligned northwest-southeast (Fg 8.110, Sellevold 1999), and placed on her back with legs flexed and laying to

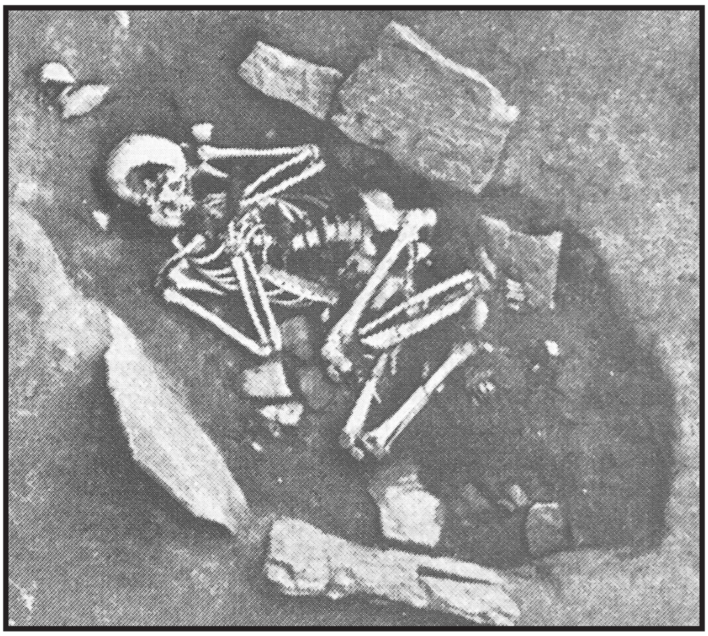

Figure 8.110, Westness 5 in Situ (Kaland 1993: 313).

Figure 8.111, The Humeri of Westness 5 Showing Retroversion of the Right Head (Author's Image).

the right; arms crossed atop the chest at the wrists (Kaland 1993). Included in the grave was a sickle, bone comb, bronze pin and two spindle whorls. These included goods have been dated 850-950AD (Table 6.5).

Individual 5 exhibited humeral head retroversion in the right arm (Fg 8.111). It is as yet unclear why this occurs; however, retroversion has been linked to athletics which involve throwing: baseball, basketball, and so forth (Chant *et al* 2007, Yamamoto *et al* 2006). It seems plausible, therefore, that she had performed some activity which involved throwing during her lifetime.

Two defects were present on her skull (Fg 8.112). A 5mm flake of bone had come loose and then reattached to the left mandibular condyle. There was also a 10mm ovate depression on the ectocranial surface of the frontal bone near bregma. In the centre of this depression, there was a raised nodule that also

Figure 8.112, Ovate Lesions in Cortical Bone of Westness 5 (Author's Image).

appeared to be bone that had detached and then refused.

Individual 5 also displayed multiple signs of having had advanced leprous destruction (Kjellström 2012, Magilton *et al* 2008, Stone *et al* 2009). The pedal bones had new bone growth, the metatarsals had knife edge remodelling, and both the metatarsals and phalanges exhibited narrowing and truncation. The tibiae and in particular the fibulae had thick periosteal bone growth and cortical thickening. The zygomata also had new bone growth and the left process was severely thickened with rugged cortical remodelling (Fg 8.113).

Figure 8.113, Left Zygoma and Zygomatic Process of Westness 5 (Author's Image).

Lastly, the maxilla exhibited erosion of the nasal sill and the palatine surface, and pitting of the nasal spine (Fg 8.114).

Figure 8.114,

Maxilla of Westness 5 Showing Nasal Sill Erosion (Author's Image).

8.13.6 Westness 7

Individual 7 from Westness was a skeletal female in the mature adult category. She had been placed in a cist with no grave goods. Radiocarbon testing produced a date of 423-620 Cal AD, 2σ (Barrett *et al* 2000). Examination of the vertebrae revealed a large cavity on the left side of the body of the 10th thoracic vertebra, with well-defined, rounded margins. A similar lesion was present on the adjoining left rib (Fg 8.115). The lesion measured 16.9mm (A-P diameter) x 12.8mm (S-I diameter) x 17.9mm into the vertebral corpus. The rib lesion measured 15mm (M-L diameter) by 13mm (S-I diameter) and extended posteriorly, 8.5mm. There appeared to be no morphological changes to the vertebral corpus outside the lesion itself. The shape of the rib did show some changes in shape consistent with displacement by or encapsulation of an orbiculate object. Cortical bone was evident on entire surface of the walls of both cavities; although there was

Figure 8.115, 10th Thoracic Vertebra and Rib of Westness 7 (Author's Image).

some perforation, especially in the rib lesion.

Radiographs revealed that the margins were not sclerotic (8.116). The structural integrity of the bone matrix was intact with no collapse. No other

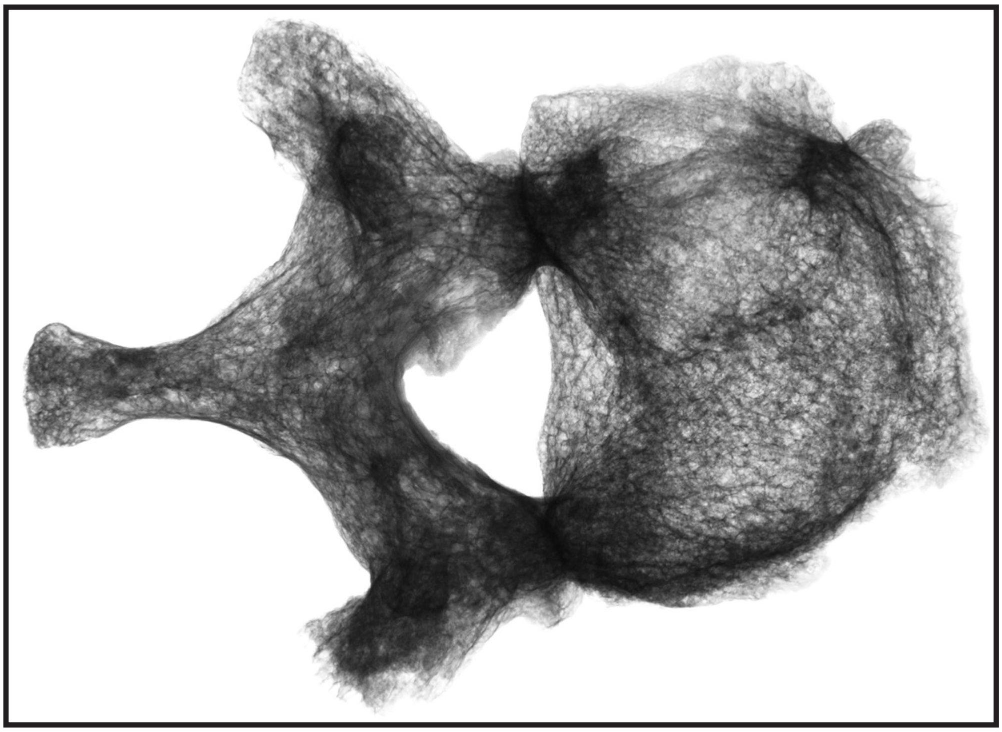

Figure 8.116, Radiograph of the 10th Thoracic Vertebra of Westness 7 (Author's Image).

lesions of similar form were evident in the skeleton. The vertebrae exhibited osteophytosis consistent with age related degeneration. Radiographs also illustrated a thinning in trabeculae, which could be indicative of osteoporosis, osteopenia, or simple age related bone loss.

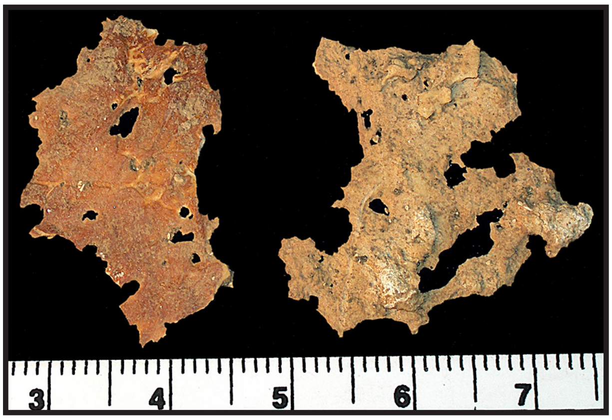

Figure 8.117, Bony Matter Found in the Thoracic Region of Westness 7 (Author's Image).

Additionally, there was a small amount of 'bony matter from within the rib cage' (as recorded on the artefact bag, Fg 8.117). This bony matter is consistent with calcified tissue; most probably pleural. One rib exhibited a non-aligned fracture that appeared to be partially healed (Fg 8.118). Unfortunately, the ribs were partially fragmented and reassociation with the remainder of this particular rib was not possible. Determination of which rib or where along the rib this fracture occurred was not possible.

Figure 8.118, Broken Rib End from Westness 7 (Author's Image).

The Westness excavation has not been well published, nor was a site report available for examination. Context information was ascertained from the human remains report (Sellevold 1999), a book section (Kaland 1993), the information written on both the boxes and the context bags, and any additional material included with the skeletons. While non-human elements were not recorded, notice was taken of their existence. Associated material included

Figure 8.119, Ossified Hydatid Shell from Westness 6 (Author’s Image).

canine skeletal elements, especially dentition.

In addition, the grave of Individual 6 included a probable calcified hydatid cyst, most likely a daughter cyst (Fg 8.119). Unfortunately, this cyst was recorded only as ‘associated material’ and it can therefore not be determined if, in vivo, this was inside the body of Individual 6, or if it was merely a part of the grave fill.

Echinococcus is commonly known as the hydatid tapeworm. Humans acquire echinococcosis by ingesting items contaminated by infectious faecal matter. Unlike within the natural secondary hosts, the pupating hydatid larval cysts are not passed along to their primary hosts and cysts remain in stasis inside the infected human (Cummings *et al* 2009; Lightowlers and Gottstein 1995).

The liver is the most commonly affected organs in humans: 75% (Pedrosa *et al* 2000). Bone involvement occurs in only 0.5%-2.5% of cases (Ebrahimi *et al* 2007). The most common bone involvement occurs in the spine: forty to fifty percent (Ebrahimi *et al* 2007, Eckert *et al* 2001, Ortner 2003: 338), normally resulting when the exophytic growth of the cyst expands to press against the spine (Pedrosa *et al* 2000). The caudate lobe of the liver abuts the tenth and eleventh thoracic vertebrae, wrapping the right hepatic lobe around the spinal column. Forty to 44% of spinal lesions are located in these vertebrae, adjacent to the liver (Aufderheide and Rodríguez-Martin 1998: 241–2).

The lesions are lytic, well defined, focal, and tend to be smoothed walled (Aufderheide and Rodríguez-Martin 1998: 241–2, Pedrosa *et al* 2000).

Periosteal reaction is not common; although reaction can occur if there is a rupture of the cyst (Ebrahimi *et al* 2007; Ortner 2003: 337). As the cyst grows, it displaces the bone matrix. This process is usually slow enough that the affected bone is able to resorb the displaced bone while maintaining a cortical wall between the cyst and the trabeculae (Belzunegui *et al* 1997, Ebrahimi *et al* 2007). Though perforation of the cortex can occur, the cyst essentially becomes part of the support system of the bone. Structural collapse tends to occur only if there is extensive bone displacement and a rupture of the cyst (Aufderheide and Rodríguez-Martin 1998: 241–2; Eckert *et al* 2001).

Lesions normally occur in the body or posterior arch of the vertebra. Extensions into adjoining vertebrae or adjoining ribs are common (Aufderheide and Rodríguez-Martin 1998: 241–2, Eckert *et al* 2001, Pedrosa *et al* 2000). If the infestation spreads to the lungs, the mildest of symptoms are chest pain or trouble breathing (Pedrosa *et al* 2000; Santivanez and Garcia 2012). However, the most common reactions are: violent coughing with expectoration, pleurisy, pneumothorax, and pulmonary empyema, with the most severe cases involving calcification of pulmonary tissue (Aribas *et al* 2002, Chan *et al* 2002, Pedrosa *et al* 2000).

The location and presentation of the cavitation at T10, along with the additional ossified material and broken rib suggests that Individual 7 was infected by echinococcosis.

8.13.7 Westness 13

Individual 13 from Westness was a young child who lay in a general east-west alignment in rectangular grave (Sellevold 1999). Radiocarbon places this individual in the 7^{th} to 8^{th} centuries (Table 6.7), which would theoretically indicate the pre-Norse (or Pictish) period. No information specific to this individual was available; however, Kaland (1993: 312-14) states that the

‘Pictish’ graves were completely or partly lined with stone slabs, some having slabs covering the body. Some graves were only shallow trenches. She also states that the Picts had no grave-goods and lay supine in narrow grave cuts.

Individual 13 exhibited lacy bone proliferation on the cortical surface of a large portion of the skeleton (Fg 8.120).

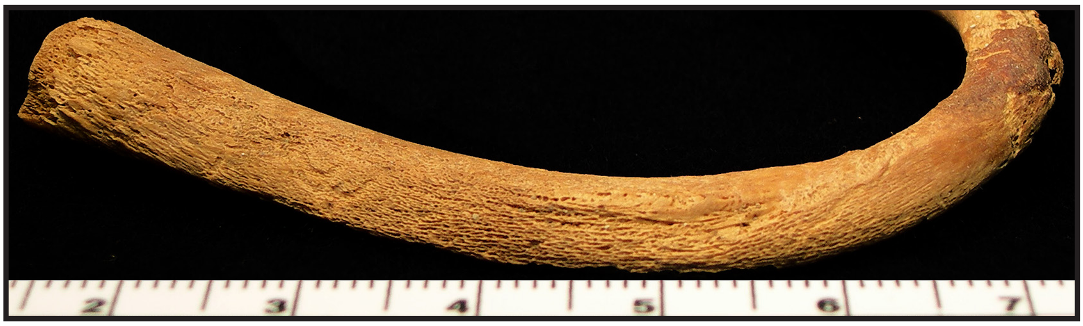

Figure 8.120, Lacy New Bone on Rib of Westness 13 (Author’s Image).

In addition, the anterior dentition exhibited a curved area of hypoplastic discolouration comparable to that seen in Hutchinson’s incisors (Fg 8.121).

The unerupted molars also contained small, rounded cusps on the occlusal surface suggestive of mulberry molars (Fg 8.122).

Figure 8.121, Hypoplasia of Incisors of Westness 13 (Author’s Image).

The presentation of the skeletal changes in this young child is suggestive of congenital syphilis (Basu and Kumar 2013, Bauer 1944). Congenital syphilis is the sexually transmitted form of treponema, which crosses the uterine barrier and infects a foetus in the womb (Wicher and Wicher 2001).

Figure 8.122, Molars of Westness 13 with Cuspules Indicated (Author's Image).

In most cases, the pathogen infection will abort the pregnancy. There are, however, certain times in foetal development when the disease can infect the foetus and the pregnancy remain viable (Fg 8.123, Basu and Kumar 2013,

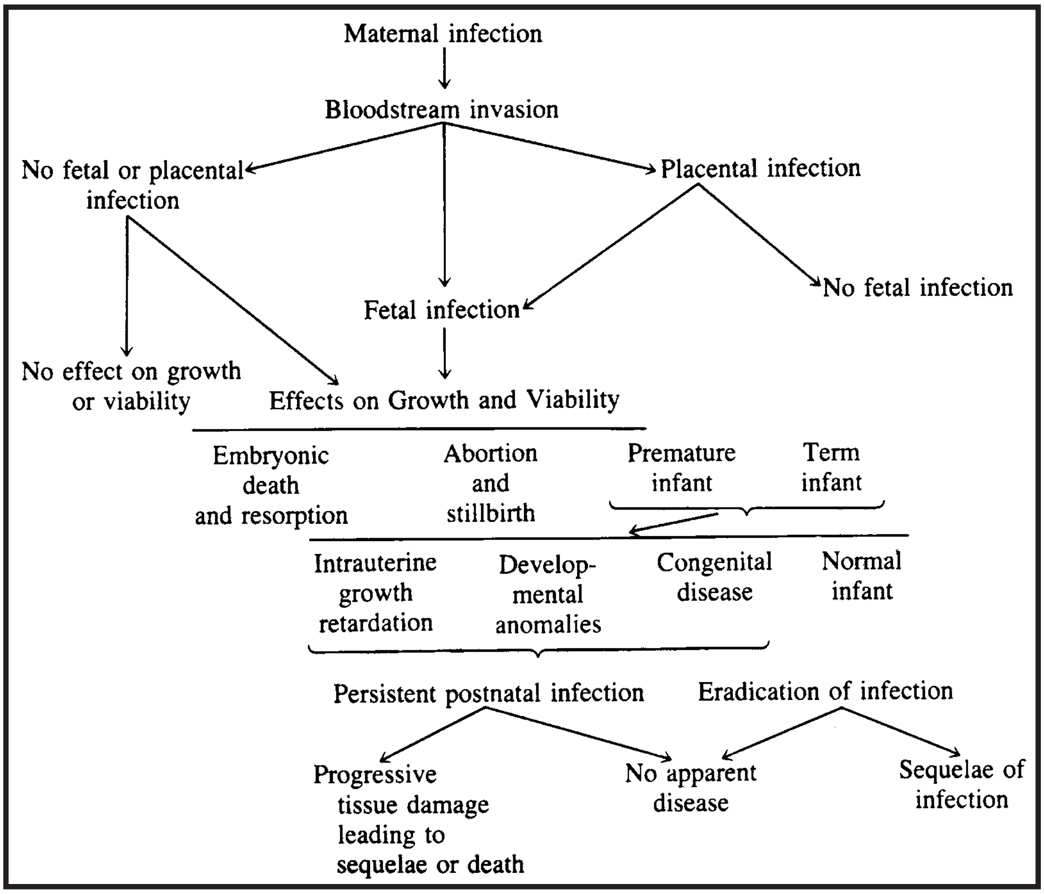

Figure 8.123, The Pathogenesis of Infectious (Syphilitic) Disease During Pregnancy (Remington *et al* 2011: 5).

Hager 1978, Wicher and Wicher 2001). The progression and presentation of congenital syphilis will vary dependent upon at which of these critical periods the disease is contracted. Many infants who survive the pregnancy will suffer a systemic, very painful, skin rash, and many of those infants will not survive to their first birthday. Cavallaro (1909) indicates a death rate of 92 out of 100 cases of congenital syphilis.

Hutchinson was the first to positively link congenital treponema to the dental defects sometimes seen in survivors of the disease. These include incisors with a hypomineralised notch-shaped defect in the occlusal surface. This hypomineralisation is often accompanied by a narrowing of the tooth in the mesial-distal plane. This weakened enamel erodes quickly in a living child and will leave an actual notch in the dentition (Fg 8.124).

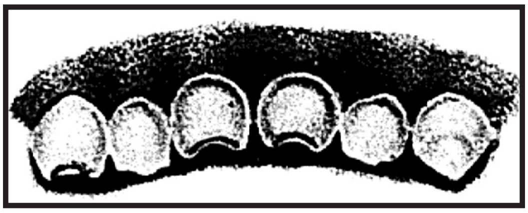

Figure 8.124, Hutchinson's Incisors (Hutchinson 1887).

In addition, amelogenesis can also be interrupted in the formation of the molars, especially the first molars, producing a nodule-like occlusal surface: mulberry (Fg 8.125) or Moon's molars (Hillson *et al* 1998, Jacobi and Cook 1992).

Figure 8.125, Example of Mulberry Molars (Modified from Freiman *et al* 2009: 292).

A systemic skin infection could induce bone proliferation as seen in Westness 13, which is a common symptom in congenital syphilis. Unfortunately, it is also a symptom of many other conditions and the presence of the bone proliferation is not intrinsically diagnostic.

The dental defects are more diagnostic, however, the incisors are also problematic. The bulk of the literature asserts that Hutchinson's incisors only occur in the permanent dentition, not the primary (Hillson *et al* 1998). There is, however, minimal literature which *does* suggest a similar enamel defect occurring on the primary dentition (Cavallaro 1909, Khetarpal *et al* 2011). It is suggested that the defects are not seen in the primary dentition because, in the early years of medicine, a foetus surviving the disease when it is active at the stage for incisor development was rare; and, in the current era, modern medicine would cure the disease prior to it becoming active at the appropriate stage in dental development.

The differential diagnosis of congenital syphilis is problematic in and of itself due to the ongoing debate of the origin (old-world/new-world) and date of onset (pre- or post-Columbus). A more in-depth investigation is beyond the scope of this thesis. It is therefore conditionally suggested that Westness 13 could be a rare case of congenital syphilis. However, further, microscopic testing would be advised to confirm or disprove this diagnosis.

8.13.8 Westness 25

Westness 25 was a middle child dated to the 7th century (Sellevold 1999, Table 6.7). The grave was aligned roughly southwest-northeast; however, no other information was available regarding the grave environment of this individual. The child exhibited some cribra orbitalia with HVVI in the vertebral bodies. In addition, this individual exhibited coxa vara in the right side femur (Fg 8.126). The change in angle did not appear traumatic. The original skeletal report states that the corresponding acetabulum was 'enlarged and deformed' (Sellevold 1999); however, the innominate was absent from the box in which SK25 had been curated. It is therefore unknown whether the femoral neck was a congenital abnormality, or malformed by some other process, such as rickets or tuberculosis.

Figure 8.126, Coxa Vara in Individual 25 from Westness (Author's Image).

8.14 Conclusion

This chapter presented the results of osteological an palaeopathological analysis of 321 individuals from 21 sites from early mediaeval Scotland. As expected, degenerative conditions became more prevalent with increasing age and some pathological conditions were more common in one sex over another. However, the overall results suggest a skeletally homogeneous population, without an obvious separation along 'ethnic' or 'religious' lines. The subsequent chapter will discuss the results from Chapters 7 and 8 in light of the information presented in the earlier portions of the thesis.

CHAPTER 9

Discussion and Conclusion

9.1 Review of Parameters

The original proposal for this thesis was to locate the ‘Viking’ graves from Scotland and perform a full, modern macroscopic analysis on the human remains. However, it quickly became clear that determining the ‘Viking-ness’ of a grave, a site, or an individual was far from straightforward. It also became clear that what does exist are several, untested assumptions, common doxa, about what ‘makes’ a site one particular type or another. Therefore, the research direction became an illumination of identity in the ‘Dark Age’ of Scotland, through an investigation of the graves and skeletal remains of the period.

To begin, the perimeters of geography and time needed to be established. A survey of the literature revealed that there was essentially no concept of ‘Scotland’ prior to the 8th century (Forsyth 2005, Woolf 2007). The territory which is now modern Scotland consisted of various domestic regions and petty kingdoms until the end of the 8th century. These sectors spanned the modern borders with Ireland and England. However, by the 13th century, most of the modern borderline was recognisable and the concept of Scotland as a nation was powerful enough to provoke the Scottish Wars for Independence (Brown 2004, Cowan 1984, Stringer 2005). Thus, the time frame for this thesis became the period of Scotland’s ‘becoming’: the late 8th century to the early 13th.

Since the early territories did not conform to modern boundaries, it seemed unwise to do the same. However, the geographic dimensions of this thesis were limited to those for which permission was secured for examination of the human remains; along with the practical constraints of work load, equipment availability, and funding. Therefore, the territory examined in this thesis became constrained to the modern boundaries of Scotland, plus the northern portion of England known today as Cumbria.

9.1.1 Sites in this Study

The 21 sites available for this research range geographically from Shetland to Cumbria. These were limited to sites which not only yielded human remains, but also where these remains were extant and permission could be gained for their study. They include single individual sites to sites with hundreds of graves. These sites are:

From Shetland:
- Grutness
- St. Ninian's Isle
- Sandwick

From Orkney:
- Birsay Bay
- Breckness
- Bu of Cairston
- Bustatoun
- Gurness
- Newark Bay
- Pierowall
- Scar
- Skaill House
- Westness

From Caithness and Sutherland:
- Balnakeil, Sutherland
- John o' Groats, Caithness

From the Atlantic West:
- Cnip, Lewis
- Iona Monastery
- Kiloran, Colonsay
- St. Ninian's Kirk, Bute

Cumbria:
- Carlisle Cathedral

From the East:
- Captain's Cabin, East Lothian

9.2 Review of Burial in the Early Mediaeval North

Burial deposition varied widely across the early mediaeval North (Chapter 3). At the beginning of the 8th century, cemeteries had become the norm in Ireland, England and on the Central Continent (Carver 2003, Fry 1999, Halsall 2011, 1995, Maldonado Ramírez 2011a, 2011b). Graves in these cemeteries were generally placed in a semblance of organised rows. The individuals were generally supine and extended in a loose east-west alignment. In Ireland, the trend was towards earthen graves without grave goods (Fry 1999). A large portion of these individuals appeared to have been bound in a shroud (Addyman and Black 1996, Daniell 2005, Hadley 2000), and in some cases the graves may have been lined with rushes or other foliage (Gwynn *et al* 2014, Klemperer 1992). In England and on the Continent, plain earthen graves were used, with or without the suggestion of a shroud (Reed 1995, Holbrook and Thomas 2005). Chests, boats, logs, coffins, and cists were also common enclosure types (Craig-Atkins 2012, Gräslund and Müller-Wille 1992, Härke 2014). Grave goods were generally absent or of a 'clothing fastener' type (James 1989, Sayer 2013). Certain objects which were 'symbolic' of Christianity were also increasingly included as the 13th century drew near: crosses and chi-rho symbols, croziers, pilgrim's staffs, and so forth (James 1989, Petts 2011, Sayer 2013, Thompson 2004).

In Scandinavia and Eastern Europe, cemeteries were also progressing as the norm in the 8th century. However, graves tended more towards clustered groups placed relatively near to one another, which eventually grew to become a cemetery complex (Myhre 1998, Svanberg 2003, Williams *et al* 2010). Here is where grave form varied the most in the early mediaeval North. Individuals could be placed supine and extended, flexed, or crouched. An east-west alignment was just as common as north-south and every directionality in-between. In addition, cremation was still in use, and although the practice grew out of favour the closer it came to the 13th century, it was still not uncommon at the end of the study period (Byock *et al* 2005, Hadley 2000, Kurisoo and Jonuks 2013). Enclosures ranged from plain earthen to elaborate chambers and ships (Crumlin-Pedersen 1999, Price 2008, 2002, Svanberg 2003). By the end of the 13th century, most of the more elaborate enclosure types had vanished from the record and the cemeteries had changed to more resemble the remainder of the Northern style. Grave goods during the 8th century ranged from non-existent, to extensive quantities of jewellery, animals, household goods, religious items, weaponry, gaming items, and so on (Price 2008, 2002, Ritchie 1993, Graham-Campbell 1998, Crawford 1987). By the end of the period, grave good deposition had dwindled; although, items of Christian symbolism had become a not uncommon inclusion. Grave alignments had also become mainly east-west in all areas of the North save the Baltics (Kurisoo and Jonuks 2013, Lõhmus *et al* 2010).

In Scotland, formal grave deposits are relatively minimal prior to the 8th century (Tucker 2010: 300-4). By the late Scottish Iron Age (300-800AD), interments become increasingly more common; the majority of which are isolated graves or small cluster groups. These burials tend to be in cists and in plain earthen graves. Grave goods are minimal and when they do occur, are in the form of a single piece of unadorned stone jewellery (Henshall 1956, Maldonado Ramírez 2011b: 94-5, 114-7, Proudfoot *et al* 1996). By the beginning of the 9th century, interment in cists or earthen graves seems to have become the norm, with an increase in cemetery use (Etheridge 1993, Maldonado Ramírez 2011a, 2011b).

9.3 Review of Assumptions

Certain assumptions exist for early mediaeval Scotland. While this type of doxa is not uncriticised in the broader literature (Arnold and Wicker

2001, Gowland and Knüsel 2006, Halsall 2011, Petts 2011), it has not been fully tested for early mediaeval Scotland. An extensive evaluation of these assumptions needs to be performed in order to provide an accurate understanding of the time period.

These assumptions are:

1). **The 'Norse' and 'native Scots' are inherently different.**
It is generally posited that there is a de facto biological and cultural separation between the Norse and the natives (Barrett 2011, 2003, Crawford 2000, Graham-Campbell and Batey 1998, Ritchie 1993, 1974). This de facto differentiation, makes the discernment of the two peoples easily detectable within the archaeological record. This also separates Scotland into two territories: the north-west and islands, where the Norse held control; and the remainder of the mainland, which was essentially under the purview of the Scottish crown.

2). **'Christians' and 'pagans' are inherently different.**
While there is no, specific, assertion that a substantive biological division exists between pagans and Christians; there is a general acceptance that religion dictates the way an individual or group conducts their life. This includes the things eaten, clothes worn, tasks done or not done, and so forth. These things can and do alter one's phenotype, and this would be theoretically visible in the human remains of that individual. Additionally, religion tends to proscribe a material culture which is particular to that religion and can be evident in the archaeological record; further promoting the separation between these religious groups.

9.4 No One Wants a Corpse

Identity is constructed, maintained, and realised through a complex interplay of cognitive, emotional, cultural, personal and social processes. In the early mediaeval North, these processes were underlain with the need to be productive and to act with integrity (Brundage 1984, Clover 1993, Pakis 1991, White 2005). Some researchers have suggested that individuals who—theoretically—could not contribute to the greater good were of little worth in early mediaeval society (Boswell 1984, Crawford 1999, Lee 2011, Metzler 2006, Wicker 2012). However, the need to be useful, did not presuppose a disdain for the weak or disabled. As stated in the *Hávamál* (Section 2.3), all the living have something to contribute. Deficiency is a common component of human life and it was well known to early mediaeval peoples. As such, there were provisions for human shortcomings.

Law codes, for example, protected the growing foetus and punished anyone who harmed this new individual (Bitel 1996, Haenel 1865, Kenny 2007, Kinealy 2008, Scott 1910, Wemple 1981). Small children and infants, who could have been considered a burden, have been interred with mammary pots, beads, shells, and toys; suggesting affection, not disdain (Crawford 2000, 1999, Lacaille 1950). Furthermore, Brehon and Anglo-Saxon law codes allowed for a person's mental ability to make rational decisions in determining an individual's accountability (Hall 1916, Isaacs 1918, Kelly 1988, Ni Chonaill 2008). One of the most striking examples of this Northern view of the 'disabled' is of *Ívarr hinn Beinlausi*, named such because of his was born with weak limbs and unable to stand (van Dyke 2011). However, instead of abusing or even killing him, he was carried around on a shield. *Ívarr* is hailed for his wisdom and is *still* considered one of the greatest viking warriors.

Within the research population, this pattern holds true. Children aged three and younger are particularly used as examples of potential derision, particularly for pagan peoples who did not have the weight of the Church pressing a doctrine of ‘life for all’; purportedly signified by the lack of these small children in pagan cemeteries, vis-à-vis the comparative prevalence of the very young in Christian burial grounds (Crawford 1999, Gräslund 2003, Wicker 2012).

However, in this research, the commonly accepted as ‘pagan’ cemetery of Cnip has three children age three or younger out of a total seven individuals; while the accepted ‘Christian’ site of St. Ninian’s Point, Bute has no children whatsoever. In addition, the child burials from this research were placed right alongside and in generally in the same manner as the adult. In fact, in some cases, such as at St Ninian’s Isle, Shetland, the small children were interred with grave goods (beads, shells, and so forth), while the adults were reportedly interred with nothing[1] (Barrowman 2011, 2003). Most of these infants and small children were buried together, lain side by side under a cairn. This would seem to imply that the young were ‘special’ to the creators of the cemeteries, not burdens to be discarded as soon as possible.

If ‘usefulness’ meant weakness was despised, the elderly and the disabled would also have been, at most, second class citizens, and at worst, pariahs who were easily discarded. However, Female 53b from Captain’s Cabin lived to young middle adulthood despite the inability to fully use one hand. Additionally, she was interred alongside and in the same manner as others in the community as if an accepted member of society (Moloney *et al* 2001, Perry *et al* 2000). Female No 5 from Westness exhibited pathology consistent with the advanced stages of leprosy. Osteologically this manifested as leg, foot and splanchnocranial damage. In life, she could have been blind, deaf, and unable to walk on her own (Brand 1981, Malla 1981, Slim *et al* 2011, Waddell *et al* 1995). However, she was also interred alongside the

1 With the exception of the knife with St. Ninian’s Isle Individual 5.

others in the community in a comparatively well furnished ‘viking-style’ grave (Owen and Dalland 1999). These are far from the only examples of such circumstances: Hubert from St. Ninian’s Isle, Individual 25 from Westness, and the many other individuals with potentially debilitating conditions: TMJ, degenerative (vertebral) joint disease and osteoarthritis, brucellosis/ tuberculosis, rickets, scurvy, and so forth. Therefore, indications suggest that the assertion that the ‘weak’ were unimportant or even pariahs appears to be incorrect.

9.5 The Road to Adulthood

Despite some recent suggestions that children had little to no value in the mediaeval era, presumably due to the increased burden placed on caregivers (Boswell 1984, Crawford 1999, Kuefler 1991, Lee 2011, Metzler 2006, Wicker 2012), all people, even those in the womb and those newly born, had value (see above). Age was generally understood chronologically; however, an individual’s ability also played a part in determining a person’s ‘age’ (Crawford 1999, Greenleaf 1978, Helgadóttir Yershova 2008, Lewis-Simpson 2008a, Percivall 2008, Sánchez-Martí 2008, Sigurðsson 2008, Stoodley 2000). Gender was broadly differentiated by biological sex (Cowan 2011, Hanawalt 1986, Newman 2007, 2001). Again, this is generally born out in the osteological results (Chapter 8). Many of the separations seen in HGLM evaluation were sex or age based (or both).

Whether boy or girl, it was very common for a child to be fostered (Hansen 2008, Ni Chonaill 2008). As a general rule, this occurred about age seven; however, this could happen as early as infancy (Boswell 1984, Parkes 2004). This was often the beginning of occupational training for the child. In keeping with what are now considered ‘traditional’ roles, men were the blacksmiths, traders, warriors, and so forth (Bitel 1996, Hanawalt

1986, Newman 2007, Orme 2001). Women were generally in charge of food production, child rearing, cloth and clothing production, and other such occupations. However, women could, and did, farm, trade, and even wage war (Jewell 1996, Poole 2013, Pounds 2014). Men could and did cook and produce clothing.

Evidence of such professions are in the form of trading scales at Kiloran (Anderson 1907, Müller-Wille 2007, RCAHMS 2016); a weaving batten, spindle whorls, and linen smoothing plaque for cloth production at Scar (Owen and Dalland 1999 RCAHMS 2016), and needles or cases at Scar (Owen and Dalland 1999 RCAHMS 2016), Balnakeil (Batey and Paterson 2012, Low et al 2000), and Cnip (Dunwell et al 1995, Welander et al 1987). It is, of course, not known if the items found in the graves were intended as markers of occupation or some other esoteric symbol.

9.6 Religion

In the disciplinary field of the early mediaeval, there is considerable criticism concerning simplistic categorisation of things as one particular religion, or indicator of a particular religion, or another (Halsall 2011, 1995, Hoggett 2007, Insoll 2004, Maldonado Ramírez 2011a, 2011b, Petts 2011, 2000). This critique has yet to be fully examined in the area of early mediaeval Scotland and was tested as a part of this thesis. Therefore, the commonly accepted designations for each research site was used to compare to the data collected in order to analyse the validity of such assumptions.

9.6.1 Religion: Sites

Due to incomplete records, in-depth analysis of each site, along with a direct site-to-site comparison, was not possible. Sites were evaluated as a whole and more qualitative, rather than quantitative, methods were necessary

(Chapter 7).

The criteria used were: burial alignments and body position, grave enclosure, grave-good inclusions, and nearby structures (aka church). By using the, admittedly, more cursory qualitative system to categorise the sites, accepted religious designations were corroborated for eleven sites. These were:

Balnakeil (Pagan)	Bu of Cairston (Christian)
Captain's Cabin (Christian)	Carlisle (Christian)
Iona (Christian)	Kiloran (Pagan)
Pierowall (Pagan)	St. Ninian's Isle (Christian)
St. Ninian's Point (Christian)	Skaill (Christian)
Scar (Pagan)	

Gurness (Pagan), Birsay (Christian), Breckness (Christian), and Newark (Christian) were assessed as ambiguous, but leaning towards their accepted designations. Only Westness (Pagan), Cnip (Pagan), and John o' Groats (Christian) did not fit their generally accepted designations. No specific information was available for the burials at Grutness or Bustatoun and there was no accepted religious 'label' for Sandwick.

Predominately, this largely affirms the that the criteria used to designate the religion of a mortuary site is generally correct. Even the four sites assessed as ambiguous do 'lean' towards their accepted designations.

This having been said, two caveats must be remarked on: 1). this analysis handles each site *as a whole*. Individuals and inter-group groups are rarely uniform entities. Therefore, dealing with a cemetery population, particularly a large one, as if it were homogeneous may be unrealistic. 2). There is a potential here for a self validating reduction. In other words, these burials (or sites) are confirmed as Christian or pagan simply because we believe that is what a Christian or pagan burial should look like.

Kiloran, for example, is generally accepted as a pagan site with *potential* Christian influence due to the presence of the two inscribed cross stones (Crawford 1987: 162, Graham-Campbell and Batey 1998: 118-22). However, the Church did not specify procedures for burial (Maldonado Ramírez 2011, Petts 2011, 2000, Thompson 2004). There is no reason that these crosses could not be full symbols of faith and this grave be a *Christian* one. Even the presence of the horse can be explained as the burial of a favourite 'pet' with its master; akin to Sir Ralph Neville interred in the church choir with his greyhound (Walker-Meikle 2012). These crosses may also mean nothing at all and were simply 'borrowed' to use in the Kiloran cist.

9.6.2 Religion: People

In addition to testing the accepted religious doxa for the sites in this thesis, the human factor of these claims also needs to be tested. While religion itself is not physically heritable, it is alleged that the 'pagans' in Scotland (the Norse) came from a geographically and biologically distinct group of people than the native Scots (Crawford 2000, 1995, 1987, Graham-Campbell and Batey 1998). Religion also commonly proscribes activities, roles for individuals, clothing and often nutritional and meal requirements. Therefore, it has been suggested that 'pagans' and 'Christians' could be separated physically.

When comparing stature estimations, HGLM results indicate that sex is the deciding factor in group separation, not religion; however, the pagan group does have a broader *range* in stature than Christians (Fg 8.13). This could be a difference in nutritional intake, say the 'Christians' having a more consistent and complete intake while undergoing stature growth (Bogin *et al* 2007, Bogin

1999: 268-82); or this could indicate a broader epigenetic background for the pagan group, for instance, the ‘pagan’ vikings taking on crew members from far reaches of the globe (Ebenesersdóttir *et al* 2011, Hallgrímsson *et al* 2004, Lind 2004). However, the precise meaning of this is unclear, due to the multitude of factors which contribute to terminal stature (Arcini *et al* 2012, Inwood and Roberts 2010, Wit *et al* 2011).

Religion is the primary factor in group division for the shape of the lower limb. This is true for both the meric and cnemic indices; although; sex is also a factor in the meric index. Scatter plots indicate an overlap in the two populations (8.28, 8.29, 8.34, 8.35); particularly with the cnemic index; however, the ‘Christian’ indices have a broader dispersement. This suggests that those interred at ‘Christian’ sites may have had a wider range of terrains or activities than did the ‘pagan’ (Ruff 1987, Ruff and Hayes 1983, Ruff *et al* 1984, Shaw and Stock 2009).

For osteoarthritis, it is only the hip in which religion plays a part in group separation. Here, sex is the primary separator of the population, followed by age and *then* religion. The rate of osteoarthritis is higher in the ‘Christians’ and highest in females. The aetiology of hip OA is still poorly understood; however, there does appear to be a connection to heavy lifting and active sports activity (Hoaglund and Steinbach 2001). Therefore, it is possible that the ‘Christians’, and particularly females, had a heavy workload in comparison to the ‘pagans’. This might support the theory that women were considered ‘lower’ than males and made to perform much of the workload.

In the dentition, it is hypoplasia, abscesses, and periodontal disease which include religion as a primary factor in group separation. With hypoplasia it is age which comes before religion. This makes a certain amount of sense considering it is the youngest individuals who exhibit the highest rate of hypoplasia (Fg 8.88). In other words, the stress which potentially contributed to the death in the young is theoretically reflected in the dentition which was forming during that time of stress (Hilson 1996: 165-176, King *et al* 2005, Pitts 1921). ‘Christians’ illustrate the highest prevalence of hypoplasia. This could indicate a difference in nutritional intake—including that of the nurse, weaning age or weaning stress, or some other type of stress to the ‘Christian’ young compared to those of the ‘pagans’.

With periodontal disease, sex is the primary factor before age and then religion. With abscesses it is *only* religion which is a deciding factor; ‘pagans’ having a 6.8% rate and ‘Christians’ having a 5.4% rate (Fg 8.88). Again, this would seem to indicate a difference in diet and(or) dental care between males and females (periodontal disease only) and ‘pagans’ and ‘Christians’ (Johnson and Curtis 1994, Page and Beck 1997).

Again, there are the caveats mentioned in Section 9.6.1: 1). analysis of each site *as a whole*; and 2). the potential for a self validating reduction. It is unclear what effects either religion had on age and gender roles (Chapter 2). The concept of all individuals having worth has previously been touched on (Section 2.4). Although, infant exposure was used as a form of control of household size, there is debate over how much this was used and how often it ended in actual death of the child (Boswell 1984, Mays 2000). The Church condemned infanticide and abortions, and yet these practices did occur, sometimes by monks and nuns themselves (Callan 2012, Mistry 2011). In this research, we have the example of the ‘pagan’ sites *with* small children (Westness and Cnip) and the ‘Christian’ sites without (Skaill, St. Ninian’s Kirk), suggesting that the idea that ‘pagans’ gave little value to the very young is inaccurate. We have also seen the examples of the ‘old’ adults in this research who were treated, funereally, the same as the rest of the population: Westness 5 and the woman from Scar for ‘pagan’ examples, and Hubert from St. Ninian’s Isle for a ‘Christian’ one.

Christian Galenists professed male superiority and the complete inferiority of women (Bitel 1996, Stolberg 2003). However, in Ireland, where this concept was purportedly more law than suggestion (Bitel 1996) it was the women who were the main benefactors of the Church, implying that women not only held influence in the Church, but also had means of their own to do so (Kenny 2006). Some nuns also became women of great authority, such as Hildegard of Bingen (Flanagan 1989).

On the ‘pagan’ side, Norse researchers often suggest a culture of ‘machismo’ (Bitel 1996, Brink and Price 2009, Campbell and John 1991, Clancy 1998, Hadley 2008, Harper Dunn 2006) placing women in a lesser position to men. However, Norse women became very powerful people: *Auðr djúpúðga Ketilsdóttir* (Unn the Deep-minded) to name one of the most famous (Smiley 2000b).

It is also unclear how strictly the early medieval populace adhered to the male-female dyad when navigating gender. However, with the limited information available at this time, using biological sex as an indicator of gender is reasonable. Within the research population, there is little to suggest that women were considered ‘lesser’ citizens or that men were given some sort of preference. One possible indication of inferiority is the increase in hip osteoarthritis for ‘Christian’ women (Section 8.7.4). This is suggestive, however, there is not enough information on the aetiology of this condition as yet to confirm or refute this suggestion (Cooper *et al* 1998, Hoaglund and Steinbach 2001).

In sum, there does seem to be a few physical differences between the ‘Christians’ and ‘pagans’. However, in many ways these differences are minimal. Osteoarthritis and joint degeneration, for example, is statistically indistinguishable for all analysed joints including the spine, save the hip. Additionally, it is sex which is the primary discriminator in hip OA and *then* religion. There is also some caution to be taken in the relatively small number of ‘pagan’ samples in comparison to the ‘Christian’ data set.

9.7 Ethnicity

As with religion, there has been a considerable amount of critique concerning the simplistic separation of individuals and groups into ethnicities (Curta 2011, Halsall 1995, Jones 1997, Nagel 1994, Werbart 2006). Section 4.5.1 discusses these theories in light of the mediaeval concepts of fosterage, family, allegiances and culture. This concept has also not been fully investigated for early mediaeval Scotland. Therefore, testing the accuracy of labelling a site as ‘Norse’ or ‘native’ based on burial form was an important part of this thesis.

9.7.1 Ethnicity: Sites

Burial forms are commonly considered symbols of religion; however, religion is often a large part of an individual’s ethnic identity (Kim 2011, Wormald 2005: 187-8). The Norse came from an area with several burial rituals which were perceptibly different than the native Scottish rites. Prior to ca 1000AD, the Norse are generally believed to have continued these rituals in Scotland, theoretically making the material culture an ‘obvious’ population separator (Barrett 2011, 2003, Crawford 2000, Graham-Campbell and Batey 1998, Ritchie 1993, 1974). Not all Norse burial forms were distinct from the Scottish. Additionally, the presumed ca 1000AD assimilation of Christianity theoretically eliminated the ‘old’ ways of Norse burial. However, if the presumption of a distinctive-intrusive burial rite is accurate, then the ‘diagnostically’ Norse features should only appear at the Norse sites.

Again, incomplete records prohibited an in-depth analysis and direct site-to-site comparison of each site. Sites were evaluated as a whole and more qualitative, rather than quantitative, methods were used (Chapter 7).

The criteria used were: burial alignment, body position, and grave-goods (including distinctive Norse enclosure types, such as boats or chambers). The first criterion, the alignment of the body, produced four native sites at which non-native alignments occur: Captain's Cabin, Carlisle Cathedral, St. Ninian's Bute, and Sandwick. At Captain's Cabin, no explanation is given by the excavators for the graves with non-east-west alignments (Moloney *et al* 2001). At Carlisle, MacCarthy *et al* (2014a, 2014b) have suggested a Norse influence on the area, which could explain the grave alignments being north-south and southwest-northeast. At St. Ninian's Bute, the graves with a north-south alignment are suggested to be pre-Christian native (Aitken 1955). While this is possible, a full excavation report has not been made and no radiocarbon dates have been attempted for this site. Therefore, it is not possible to make an ethnic determination of these graves one way or another.

The second criterion for ethnic determination of a grave, position of the body, found no site with a body position contrary to the accepted site designations (although, see Sandwick below). This could indicate that body position *is* an accurate determiner of ethnicity in early mediaeval Scotland. It should, however, be noted that there is a lack of accurate documentation for many of the research sites, and this determination may change, should further information become available.

At Sandwick, the grave alignment is southwest-northeast and the body position is prone and extended. The meaning behind a prone body position is unclear (Section 3.4.2). The radiocarbon date for the individual is ca 4th century (Bigelow 1984). This is not only pre-Norse, this is at a point in the late Iron Age where many forms of corpse disposal still did not include burial (see Tucker 2010). This implies that this individual was native, yet possibly interred in an alternative or transitional rite. As this site lies outside the time frame of this thesis, further explanations will not be explored here.

The final criterion used to assess the accuracy of determining ethnicity, the quantity and type of grave goods revealed a somewhat mixed result. Carlisle, for example, is generally accepted as a native site; however, the McCarthy *et al* (2014a, 2014b) research hypothesised that the 'Norse' were contributors to the development of the site. Some of the items found in the graves could suggest truth to this theory. Buckle sets were the most commonly discovered items. It is generally believed that native burial rites did not leave an obvious archaeological trace. Therefore, the presence of the belt fittings may be an indicator of Norse influence. However, the belt fittings themselves are more Anglo-Saxon than Norse in style. Some of the fittings are even Carolingian (McCarthy *et al* 2014a). Individual 54 is the primary instance suggestive of Norse ethnicity. His burial goods include a whetstone, an antler comb, and a knife. While these items are often found in Norse, particularly pagan, graves; their style is Anglo-Saxon in nature. This suggests that this is a 'native' site, and not 'Norse'.

Again, detailed records were not available for many of the sites in this research. Therefore, the analysis of grave goods was on the superficial side and further information may alter the results. The caveats from Section 9.6.1 also apply here: 1). analysis of each site *as a whole*; and 2). the potential for a self validating reduction. However, what is suggested by the current data is that determinations of ethnicity by grave goods has potential for accuracy and yet should be given with caution.

9.7.3 Ethnicity: People

Because the Norse purportedly came from disparate ancestral stock, it is often taken for granted that they are biologically different from the native Scots (Barrett 2011, 2003, Crawford 2000, Graham-Campbell and Batey 1998, Ritchie 1993, 1974). If accurate, a statistically significant difference should manifest in the research results. If the generally accepted site classifications are valid, such differences should correlate with those classifications.

One of the main sources for the determination of an individual's ethnicity, at least in the modern West, is one's facial appearance. In this research, only 26 individuals yielded crania intact enough to make a comparison. Discriminate function analyses showed that, while there was a bit of separation between the 'Norse' and 'native' (Fg 8.10), the majority of the crania are comparable one with another. This suggests a homogeneous population when it comes to cranial phenotype; however, this is only a small portion of this early mediaeval population and may not be a representative sample. This also may suggest that ethnicity, in an early mediaeval Scottish sense, may not have been based on physical appearance, but on another characteristic entirely.

In stature and in the meric index it is sex which is the major factor in separating the groups, not ethnicity. The 'native' group appears to have a broader range of stature, particularly when comparing the males (Fg 8.14). 'Natives' seem to generally have larger femora than then the 'Norse' (Fgs 8.30 and 8.31); however, the indices are comparable. This could imply that the 'natives' were generally stockier than the 'Norse'. Further research would be needed to determine this supposition either way.

Ethnicity is the primary factor in group separation, followed by sex, when analysing vertebral degeneration. This is particularly obvious when comparing males (Fg 8.45). 'Native' males have less degeneration throughout the spine than their 'Norse' counterparts. This could mean that the 'Norse' performed activities which were more destructive to the vertebral joints, that they were genetically predisposed to spinal degeneration, or a combination of the two (Eubanks *et al* 2007, Fujiwara *et al* 1999, Stirland and Waldron 1997).

In the remaining joints of the body, it is only in the knee, that ethnicity is a factor in group separation; although, age is the primary factor. 'Norse' males have a 31.3% higher rate of OA in the knee than 'natives', and 'Norse' females have a 396.8% higher rate than their 'native' counterparts (Fg 8.65). This suggests an activity of high impact wear to the knee in the 'Norse' (Coggon *et al* 2000, Cooper *et al* 1994, Rogers and Dieppe 1994); particularly in 'Norse' females.

In terms of the dentition, ethnicity was only a factor in the prevalence of abscesses. This could suggest a difference in culinary type, preparation style, dental care, or a biological proclivity towards the condition (Johnson and Curtis 1994, Page and Beck 1997, Rodini *et al* 2004). It should be noted that the prevalence rate for 'natives' is 5.1% and the 'Norse' is 5.9%. Therefore, it is possible that the difference in question, may be one which would not have been detectable in any real-world sense.

In all, it is the knee and spine which appears to produce a physical distinction between these 'ethnic' groups; the 'Norse' being prone to higher levels of degeneration. The aetiology of this is unknown at this time, as is the impact this would have had on social relations. However, the available funerary information suggests more acceptance than dissent.

Lastly there is the problem of treating the individuals (and their graves) at each site as all inclusive, rather than as the individuals that they are; along with the complication of classifying an ethnicity based on criteria that have not been proven to be correct for the time and place in which they are being used. In other words, possibly creating a self validating reduction.

9.8 Site Type

The designation of site type is not part of the original test assay of this thesis. However, the difference between these sites was noticed, if but in a general way, and it seemed prudent to add these variations to the testing categories. These types are: isolated burials, small cluster burials, church sites, and field sites.

Isolated sites were defined as single graves. This did not take into account grave goods, number of individuals in the grave, sex of individual or individuals, alignment or position of the body. The only criterion was that it be a single grave with no known association with any other grave(s).

Small cluster groups were graves in close proximity one with another numbering, in this research, no more than seven. Church sites have a church (or chapel) for which a reasonable connection cdan be made to the burials. Field sites were not associated with a church, ecclesiastical building, and in this thesis, any other building.

Although an increase in deaths was present which corresponded with age, field cemeteries had the flattest mortality curve of the three groups plotted (Fg 8.4). The isolated group was not included due to the low sample number. This suggests that those interred at the field sites had a more homologous mortality rate than at the other site types. This type of flattened curve tends to indicate an unhealthy (in some cases, violent) population (Paine and Boldsen 2002, Wood *et al* 2002, Yaussy *et al* 2016). Theoretically, then, there should be indications of this in the skeletal remains at the field sites. However, none of the site types have a higher rate of osteodegeneration than any other, all of the stature estimations are statistically comparable between the groups, and there is no consistent or specific pathology that would explain the flat mortality curve.

Dentition can reveal health disparities, and an HGLM did suggest that site type was a factor in the conditions of calculus, hypoplasia, antemortem tooth loss, and abscesses (Fg 8.90, isolated not included due to lack of dentition). Hypoplasia was highest at field sites (21.8%) and lowest at cluster sites

(0.0%) with church sites falling in the middle (14.4%). Hypoplasia tends to be an indicator of stress at the time that portion of the tooth is developing. If that stress is not recovered from, it can contribute to the death of that juvenile. In addition, stress early in life can contribute to poor health and even death in adulthood (Armelagos *et al* 2009, Boldsen 2007, King *et al* 2005). Therefore, this hypoplasia could be a link to the reason the mortality curve is flattened at the field cemeteries.

Additionally, prevalence of calculus was low at church sites in comparison to field and cluster sites: 26.3% compared to 78.7% and 87.2% respectively. However, church sites also have the highest prevalence of abscesses (6.9%) and antemortem tooth loss (16.6%), compared to 5.7% and 10.4% for cluster sites and 5.3% and 8.2% for field sites. This suggests a very different diet and dental care for those interred at the church sites.

9.9 Power and Weakness: Pathologies and Individual Cases

Ro milt m'oítid ar thuus,	First I consumed my youth
is buide lem ro-ngleus,	I am glad that I so decided
cid bec mo léim dar duae,	although my leap over the wall was small
níba nuae in brat beus.	the cloak would still not be new

Stanza 20 Caillech Bérri (Translation Department of Old Irish at University College Cork in Ritari 2006)

This stanza from the poem *Caillech Bérri,* or *The Lament of the Old Woman of Beare*, illustrates this woman's knowledge that no matter how she had led her life, the difficulties of age would have always befallen her. It also illustrates her happiness that she made the choices that she did.

The challenges of being human are also well illustrated in this research collection. The highest prevalence of temporomandibular joint disease appears in the oldest *and* the youngest. The TMJ increase seen with age is to be expected, since the body degenerates as time goes by (Felson *et al* 2000, Haskin *et al* 1995, Weiss and Jurmain 2007). The higher prevalence in the young is less expected; however, the low number of individuals in the middle child to early adult must be taken into consideration when assessing the prevalence rates. Regardless of the sample size, the high prevalence rate in the young could be an indication of the increased stress that lead to the death of these individuals.

Certain conditions were noted in many individuals for which it was not possible to calculate prevalence. It was, therefore, only possible to gain a qualitative sense of these conditions. The first of these was the valgus changes to the halluces; including: hallux valgus, hallux rigidus (or limitus), and bursitis. The most common of these conditions was hallux valgus; more than five times more prevalent than bursitis (38:7 respectively) and almost 13 times more prevalent than rigidus-limitus (38:3 respectively). All of these conditions suggest the early mediaeval population wore shoes with a tight, narrow distal end which compressed the toes (Coughlin and Jones 2007, Jain and Mannan 2013, Kadakia *et al* 2013).

Further conditions were upper respiratory bone proliferation and cribriform perforations in the petrous pyramid. Bone proliferation in the sinuses is commonly due to irritation or infection of the tissues (Merrett and Pfeiffer 2000, Roberts 2007). The similar bone proliferation and cribriform perforations in the petrosal are also likely caused by an infection (Chole and Sudhoff 2010, Eagleton 1936, Lammers and Krieser 2013).

Three individuals showed signs of DISH, along with a further two who evinced the signs of gout. Aside from the genetic component to these maladies, both conditions suggest access to a rich diet (Fam 2002, Li *et al* 2007, Matsuo *et al* 2011, Musha 1990, Okamoto *et al* 2004, Tanaka *et al* 2001).

This did not seem to be the case across the entire population. There were 12 infants and young children who evinced signs of rickets and scurvy, suggesting a lack of nutrition, either from direct consumption or, particularly for those still nursing, in poor or limited milk consumption (Brickley and Ives 2006, Waldron 2009: 127-9). There were also 20 instances of cribra orbitalia across the age groups, suggesting some form of anemia was present (Gowland and Western 2012, Walker *et al* 2009). Additionally, 21 individuals across the age groups had hypervascularised deep vessel impressions (HVVI) in their vertebral bodies. This could be an indicator of brucellosis or possibly tuberculosis.

9.9.1 Case Studies: Illustrations of Value

The individuals discussed in Section 8.13 highlight the sympathetic nature of this population. Captain's Cabin 53b showed signs of hand-wasting which would have produced limited use of the appendage, possibly complete inability to use, meaning she would have had to have help from others in the population to survive (Metzler 2006, Tilley and Oxenham 2011); and yet she was a young middle adult upon her death, implying that she did recieve that help, at least for a period of time.

Individual D from Cnip was also a young middle adult at the time of his death. At some point in his life, he had had a severe accident (potentially more than one). His wounds would have made mobility and food consumption very difficult during the healing process. However, all of his fractures were healed. His skeleton was robust: cortical bone thick, muscle attachments thewy, no sign of infection or stress, and so forth. Therefore, he must have been aided back to health during the healing process(es).

Hubert from St. Ninian's Isle was a mature adult who was also skeletally robust at the time of his death, despite the bilateral eburnation of his shoulders or the fracture to his sternum. He was not only apparently healthy, he was eating a luxe diet which lead to gouty lesions on his metatarsals. Westness 5 had advanced leprous deterioration, likely making mobility difficult; possibly making her blind and even deaf (Brand 1981, Malla 1981, Slim *et al* 2011, Waddell and Saunderson 1995). She was a middle adult buried in what most 'Viking' scholars would conclude a well furnished grave.

All of the above individuals made it well into adulthood despite the physical problems that would have made life challenging or conditions that may have made them a burden to the rest of the population. Westness 25 also had a condition (coxa vara), which, at minimum, would have given him(her) a limp, making ambulation difficult; yet (s)he only made it to middle childhood before death. While this is not as long of a life as the others discussed here, this does imply years of investment in this individual.

St. Ninian's Isle 5 died from sharp force trauma. It is unclear whether he received these blows in battle or from a local altercation. However, it is clear that his interment at St. Ninian's happened some time after his death. This suggests an effort taken to transfer and possibly store the body until the burial took place. Westness 13 was only a young child when (s)he succumbed to death; yet, someone invested more than a year in rearing this child. Additionally, all of these people were interred with the same regard as the other individuals in their respective cemeteries.

9.10 Difficulties and Future Work

In an inaugural project such as this one, there are many reasons that the undertaking can veer off course: improper, poor, and non-existent excavation techniques of the sites and post-excavation work; improper, poor, and non-recording of said excavation and post-excavation work; improper, poor and non-curatorial practices of any finds or of any documentation; 'acts of God' (such as flooding or fire) which destroy the records or finds themselves; and, particularly an issue with human remains, reburial. Additionally, some projects were under the purview of a particular program or individual which was unable or unwilling to share information, regardless of the time since project onset.

In Scotland, taphonomy can also be a significant issue, specifically in regards to the destructive nature of the soil ph. The soils are often not conducive to preservation of organics, and often even bone does not survive. Conversely, in some areas (parts of Shetland for instance), organics are more likely to survive than bone. For instance, extant bits of the coffin wood were all that was detectable at Kebister (Owen and Lowe 1999, Shetland Museum, Pers Comm.) All of these issues were faced during the course of this study, limiting the sample set, and potentially biasing the results.

9.10.1 Unavailable Data

Two sites in particular were under the auspices of specific project parameters and were not available to include in this thesis: The Hirsel, Coldstream, Berwickshire (NT84SW 3) and Portmahomack, Tarbatness, Ross and Cromarty (NH98SW 4). In 1977, just south of the Hirsel Golf Club, in a field called Dial Knowe, ploughing revealed a church site with cemetery (Cramp and Douglas-Home 1978, Jennings 2010: 85-89). Excavation eventually revealed a minimum 331 individuals (Jennings 2010: 87) with radiocarbon dates from the 9th to 17th centuries (RCAHMS 2016). Portmahomack church was excavated between 1994 and 2013 (Curtis-Summers *et al* 2014). This work eventually revealed a minimum 160 individuals with radiocarbon dates from the 7th to 17th centuries. It is not unusual for research to benefit from more data and a larger MNI. This thesis is particularly weighted towards northern Scotland, and especially towards Orkney. Adding the information from both Portmahomack and the Hirsel would help to balance the sample set and give a better indication of the accuracy of the results.

9.10.2 Broaden and Balance the Data Set

Well established national foundation stories support the modern separation of peoples. However, there is evidence to suggest that the territories, and potentially ethnicities, were in very different configurations during the early mediaeval period. The Irish Sea and surrounding environs, for example, has been hypothesised as one ethnic territory (Griffiths 2010, Jennings and Kruse 2009, Macniven 2013, Smith 2004, Woolf 2004). This would effectively merge the modern boundaries of Man, eastern Ireland, western Scotland, north-western England, and much of Wales and Cornwall. In light of this suggestion, it may be worthwhile to analyse to add these areas to the data set.

The Norse in Scotland are generally believed to have originated in the Scandinavian homelands and maintained that connection until at least the 13th century (Calswell 2010, Crawford 2013, 1987, Gray 1922). Traditionally, this is presumed to have caused the two populations, native and Norse, to be physically, as well as culturally, distinct (Bartlett 2001, Downham 2012, Gray 1922, Sykes 2006). Therefore, it may be of value to compare the results from this study to those from *eorum temporum* populations in Iceland, the Faroes, Norway, Sweden and Denmark. It may also be beneficial to compare this data to *eorum temporum* populations in England, Ireland and the Isle of Man. Comparing the bioculture from this broader population will help to clarify the construction of identity in the early mediaeval North.

9.10.3 Increased Specificity of Site Attributes

Due to a variety of factors, the specific layout of the sites and of the graves themselves were not available for many of the sites in this thesis. Some of these documents have been lost or never existed; as in the case of antiquarian investigations like Pierowall. This hindered inquiries into site layout, enclosure types, in-depth body positioning, grave good typology, and so forth. Should lost documents be found or access become available, adding site specific details to the analysis would allow for a more defined result.

9.10.4 Microscopic Information

The basis of this study was a macroscopic assessment of the sites and the human remains. However, a good deal of information can be ascertained from microscopic evaluation. For example, isotopes have been used to illuminate dietary intake and geographic origins (Larsen 2015: 301-56). Some isotopic studies have been undertaken for Cnip, Westness, and Newark (Barrett 2000, Montgomery *et al* 2014, 2003, Montgomery and Evans 2006, Richards *et al* 2006). Comparing strontium, oxygen, carbon and nitrogen assays for *all* the sites in this study would provide more knowledge as to the variety or homogeneity of this early mediaeval population. A similar idea can be proffered for DNA or soil analyses.

9.10.5 Potential Lines of Further Investigation

In addition to the above sections which list the possible expansions of the work begun in this research, the list below details potential projects which stem from the work begun here.

- To better evaluate gender, remove 'sex' as a factor in analysis. Then, put sex back into the analysis and compare the two results. If data set increases, do this with the five divisions of sex: Male, Probable Male, Indeterminate, Probable Female and

Female.

- Expand on the role of children in the burial rites of the early mediaeval North, including position, alignment, enclosures, grave goods, location and so forth. For example, Brough Road 2 from Birsay Bay was found under the foundations of a house (Ritchie 1974), akin to Crawford's (2008) 'Special Deposits'.
- Investigate further the presence and meaning of animal remains as a part of a grave group; particularly in Ireland, where it has been taken for granted that this is either a secondary deposit—spoil (Seaver, pers comm) or it is a deliberate slight to the interred (Fry 1999: 107).
- Compare early mediaeval Scottish graves directly to those in the 'Scandinavian Homelands', particularly the plain earthen and simple cist/coffin graves. How similar are they? Can a difference be ascertained?
- Examine further the 'Christian' or 'pagan' nature of a burial, particularly from an early mediaeval viewpoint, not a modern one. At what point does religion become the dictator of burial rites? Should Romanisation be considered in place of Christianisation? Is this a valid line of questioning?

These are but a few suggested directions for continued research.

9.11 Concluding Remarks

The highly influential thinker, René Descartes, has influenced the way we understand what is real and what is unreal since the early 17th century (Scheper-Hughes and Lock 1987). At its core, Cartesianism compartmentalises identity: culture vs instinct, mental vs physical, natural vs supernatural, and so forth. However, modern research continues to illuminate how un-compartmentalised a being really is. One cannot remove the ‘mental’ from the ‘physical’ any more than one can pull one’s brain out of one’s skull and expect to still be alive. It is all connected. Altitude, climate, weather, food consumption, bacteria, viruses, fauna, flora, clothing (the list goes on) all affect humans—individually and in groups—and we, in turn, affect them.

During the early mediaeval period, Cartesian compartmentalisation essentially did not exist. A priest was the healer of an infected wound as much as he was a healer of a tortured soul (Kieckhefer 1990, Kvideland and Sehmsdorf 1991). The midwife used medical techniques, roots and herbs, and ‘magical’ charms in the delivery of a baby (Daniell 2005, Green 2000, Sanburn 2003, Weston 1995). This amalgamation of humanness is a crucial factor in the essence of early mediaeval identity. The consideration of this mixture is a key factor in the appreciation of identity in the early mediaeval North.

The consideration of the person as a whole is also how we can ultimately illuminate the past. The body both affects and records its environment (Gowland and Knüsel 2006a, Sofaer 2006b). Therefore, the life course of an individual can be interpreted from his(her) remains; the remains themselves becoming an artefact which can be mined for information. This is, of course, a complex process. Many things can act as a catalyst for a similar result. Some interactions are, as yet, not fully understood. Taphonomic processes can also obscure or eliminate pieces of information. Therefore, gaining a clear picture of a life can be difficult; although, not impossible.

The ‘Coming of the Vikings’ traditionally heralds a new era in history (Barrett 2011, Crawford 2000, 1987, Ritchie 1993). In Scotland, as with many parts of the North, this is still considered the ‘Dark Age’—before the time of regular record keeping (Broun 1994, Gray 1922, Hedges 1993). Therefore, a relatively broad approach was taken to investigate identity in early mediaeval

Scotland.

The results if this study do show some physical differences between the commonly accepted religious and ethnic groups. It is, however, difficult to know if these variations would have been noticeable to the mediaeval population, or if these differences would have been of issue, even if they were noticeable. In addition, and despite these variations, the population seems to have been generally homogeneous.

In addition, while the commonly accepted designations of Norse-native and Christian-pagan do have a moderate validity, critical problems with this 'doxa' based categorisation were highlighted, including the very real problem of self fulfilling validation. Therefore, a significant re-evaluation of such simplistic approaches needs to occur within the discipline.

This type of synthesis is a relatively new undertaking for Scotland, thus this thesis is by no means exhaustive. There is much more investigation which could be undertaken, and it is hoped that this research will stimulate further work.

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APPENDIX

A.1 Basics of the Database

The sections that follow list the entry fields created in Access 2007. These fields were a part of digital forms which acted as gateways for entering all information gathered into data sheets.

A.1.1 Aging of Adults

Field Name	Data Type	Description
ID	Text	Skeleton Number
SB	Text	Suchy-Brooks Category
LJY	Text	Lovejoy Category
BC	Text	Buckberry-Chamberlain Category
VSC	Text	Vault Suture Closure Score
LASC	Text	L-A Suture Closure Score
AG	Text	Age Estimate

A.1.2 Aging of Sub-Adults by Bone Length

Field Name	Data Type	Description
ID	Text	Skeleton
CL	Number	Clavicle Length (mm)
HL	Number	Humerus Length (mm)
FL	Number	Femur Length (mm)
TL	Number	Tibia Length (mm)
IMW	Number	Ilium Maximum Width (mm)

A.1.3 Aging of Sub-Adults by Fusion

Field Name	Data Type	Description
ID	Text	Skeleton
CvF	Text	Clavicle Fusion
StF	Text	Sternal Fusion
CVNA	Text	Cervical Vertebrae – neural arches to each other
CVNC	Text	Cervical Vertebrae – neural arches to centrum
TVNA	Text	Thoracic Vertebrae – neural arches to each other
TVNC	Text	Thoracic Vertebrae – neural arches to centrum

Field Name	Data Type	Description
LVNA	Text	Lumbar Vertebrae – neural arches to each other
LVNC	Text	Lumbar Vertebrae – neural arches to centrum
SV54	Text	Sacral Vertebral Fusion 4 & 5
SV43	Text	Sacral Vertebral Fusion 4 & 3
SV32	Text	Sacral Vertebral Fusion 3 & 2
SV21	Text	Sacral Vertebral Fusion 2 & 1
SB43	Text	Sternebrae Fusion 4 & 3
SB32	Text	Sternebrae Fusion 3 & 2
SB21	Text	Sternebrae Fusion 2 & 1
HFCT	Text	Humerus Fusion Capitulum and Trochlea
HFH	Text	Humerus Fusion Head
RPH	Text	Radius Fusion Head
INIC	Text	Fusion Iliac Crest
INSP	Text	Fusion Ischium to Pubis
OCSQ	Text	Occiput Fusion Lateral to Squama
OCBS	Text	Occiput Fusion Lateral to Basilar
BSLR	Text	Basilary Suture
AG	Text	Age Estimate

A.1.4 Sexing

Field Name	Data Type	Description
ID	Text	Skeleton
VA	Text	Ventral Arc
SPC	Text	Subpubic Concavity
SPA	Text	Subpubic Angle
IPRR	Text	Ishio-Pubic Ramus Ridge
GSN	Text	Greater Sciatic Notch
PAS	Text	Preauricular Sulcus
PB	Text	Pelvic Brim
SM	Text	Sacral Morphology
ESS	Text	Extra Sacral Segments
NC	Text	Nuchal Crest
MP	Text	Mastoid Process
SOM	Text	Supra-Orbital Margin
SOR	Text	Supra-Orbital Ridge
FB	Text	Frontal Bossing
ME	Text	Mental Eminence
GA	Text	Gonial Angle
GF	Text	Gonial Flaring
MR	Text	Mandibular Ramus

A.1.5 Cranial Metrics

Field Name	Data Type	Description
ID	Text	Skeleton
GOP	Number	Maximum Length of Crania
EU-EU	Number	Maximum Breadth of Crania
ZY-ZY	Number	Bizygomatic Diameter
BA-B	Number	Basion-Bregma Measurement
BA-N	Number	Basion-Nasion Measurement
ECM-ECM	Number	Maxillo-Alveolar Breadth
PR-ALV	Number	Maxillo-Alveolar Length
AU-AU	Number	Biauricular Breadth
N-PR	Number	Nasion-Prosthion Height
FT-FT	Number	Minimum Frontal Breadth
FMT-FMT	Number	Upper Facial Breadth
N-NS	Number	Nasal Height
AL-AL	Number	Nasal Breadth
D-EC	Number	Orbital Breadth
OBH	Number	Orbital Height
N-B	Number	Frontal Chord
B-L	Number	Parietal Chord
L-O	Number	Occipital Chord
ID-GN	Number	Mandibular Symphysis Height
GO-GO	Number	Bigonial Width
CDL-CDL	Number	Bicondylar Breadth
MB Ascend Ramus	Number	Minimum Breadth of Ascending Ramus

A.1.6 Post-Cranial Metrics

Field Name	Data Type	Description
ID	Text	Skeleton
CLR1	Number	Clavicle (R) Max Length
CLL1	Number	Clavicle (L) Max Length
GR1	Number	Glenoid Cavity (R) Width
GR2	Number	Glenoid Cavity (R) Length
GL1	Number	Glenoid Cavity (L) Width
GL2	Number	Glenoid Cavity (L) Length
HR1	Number	Humerus (R) Max Length
HR2	Number	Humerus (R) Epicondylar Breadth
HR3	Number	Humerus (R) Vertical Head Diameter
HR4	Number	Humerus (R) Max Diameter Midshaft
HL1	Number	Humerus (L) Max Length

Field Name	Data Type	Description
HL2	Number	Humerus (L) Epicondylar Breadth
HL3	Number	Humerus (L) Vertical Head Diameter
HL4	Number	Humerus (L) Max Diameter Midshaft
RR1	Number	Radius (R) Max Length
RR2	Number	Radius (R) Max Head Diameter
RL1	Number	Radius (L) Max Length
RL2	Number	Radius (L) Max Head Diameter
UR1	Number	Ulna (R) Max Length
UL1	Number	Ulna (L) Max Length
FRR1	Number	Femur (R) Max Length
FRR2	Number	Femur (R) Bicondylar Length
FRR3	Number	Femur (R) Max Head Diameter
FRR4	Number	Femur (R) Subtrocanteric Diameter AP
FRR5	Number	Femur (R) Subtrocanteric Diameter ML
FRR6	Number	Femur (R) MidShaft Diameter AP
FRR7	Number	Femur (R) MidShaft Diameter ML
FRR8	Number	Femur (R) Epicondylar Breadth
FRL1	Number	Femur (L) Max Length
FRL2	Number	Femur (L) Bicondylar Length
FRL3	Number	Femur (L) Max Head Diameter
FRL4	Number	Femur (L) Subtrocanteric Diameter AP
FRL5	Number	Femur (L) Subtrocanteric Diameter ML
FRL6	Number	Femur (L) MidShaft Diameter AP
FRL7	Number	Femur (L) MidShaft Diameter ML
FRL8	Number	Femur (L) Epicondylar Breadth
TR1	Number	Tibia (R) Max Length
TR2	Number	Tibia (R) Proximal Epiphyseal Breadth
TR3	Number	Tibia (R) AP Diameter at Nutrient Foramen
TR4	Number	Tibia (R) AP Diameter at Nutrient Foramen
TL1	Number	Tibia (L) Max Length
TL2	Number	Tibia (L) Proximal Epiphyseal Breadth
TL3	Number	Tibia (L) AP Diameter at Nutrient Foramen
TL4	Number	Tibia (L) AP Diameter at Nutrient Foramen
FBR1	Number	Fibula (R) Max Length
FBR2	Number	Fibula (L) Max Length

A.1.7 Non-Metric Traits (‘Mutations’ in Fg A.1)

Field Name	Data Type	Description
ID	Text	Skeleton
CM1	Text	Metopic Suture

Field Name	Data Type	Description
CM4	Text	Epipteric Bone
CM6	Text	Apical Bone
CM8	Text	Asterionic Bone
CM10	Text	Ossicle(s) in Occipito-Mastoid
CM12	Text	Ossicle(s) at Parietal Notch
CM14	Text	Ossicles(s) in Coronal Suture
CM15	Text	Ossicle(s) at Bregma
CM16	Text	Sagittal Ossicle(s)
CM17	Text	Ossicle(s) in Lambdoid
CM18	Text	Inca Bone
CM19	Text	Fronto-Temporal Articulation
CM21	Text	Condylar Canal
CM23	Text	Divided Hypoglossal Canal
CM25	Text	Double Condylar Facet
CM27	Text	Tympanic Dehiscence
CM29	Text	Auditory Exostosis
CM31	Text	Multiple Mental Foramina
CM33	Text	Mylohyoid Bridge
CM35	Text	Mandibular Torus
CM36	Text	Maxillary Torus
PM1	Text	Atlas Bridging
PM2	Text	Accessory Transverse Foramen
PM3	Text	Circumflex Sulcus
PM4	Text	Acromial Articular Facet
PM5	Text	Sternal Foramen
PM6	Text	Septal Aperture
PM7	Text	Supracondyloid Process
PM8	Text	Allen's Fossa
PM9	Text	Poirier's Facet
PM10	Text	Third Trochanter
PM11	Text	Vastus Notch
PM12	Text	Medial Tibial Squatting Facet
PM13	Text	Lateral Tibial Squatting Facet
PM14	Text	Double Inferior-Anterior Talar Facet
PM15	Text	Double Anterior Calcaneal Facet
PM16	Text	Accessory Sacral Facet(s)
PM17	Text	Sacralised L5
PM18	Text	Lumbarised S1

A.1.8 Cervical Vertebrae

Field Name	Data Type	Description
ID	Text	Skeleton
No	Text	Vertebra Number
FTR	Text	Feature
SD	Text	Side
ASPT	Text	Aspect
OPL	Text	Osteophyte Location
OPS	Text	Osteophyte Score
EBL	Text	Eburnation Location
EBS	Text	Eburnation Score
POL	Text	Porosity Location
POS	Text	Porosity Score
SN	Text	Schmorl's Nodes
CD	Text	Cortical Defects

A.1.9 Thoracic and Lumbar Vertebrae

Field Name	Data Type	Description
ID	Text	Skeleton
No	Text	Vertebra Number
FTR	Text	Feature
Wdg	Text	Wedging
SD	Text	Side
ASPT	Text	Aspect
OPL	Text	Osteophyte Location
OPS	Text	Osteophyte Score
EBL	Text	Eburnation Location
EBS	Text	Eburnation Score
POL	Text	Porosity Location
POS	Text	Porosity Score
SN	Text	Schmorl's Nodes
CD	Text	Cortical Defects

A.1.10 Entheses and Enthesopathy ('MSMs')

Field Name	Data Type	Description
ID	Text	Skeleton
Lctn	Number	Location
SD	Text	Side
MR	Text	Robusticity Score
ML	Text	Lesion Score

A.1.11 Joint Disease

Field Name	Data Type	Description
ID	Text	Skeleton
Lctn	Number	Location
SD	Text	Side
OPL	Text	Osteophyte Location
OPS	Text	Osteophyte Score
EBL	Text	Eburnation Location
EBS	Text	Eburnation Score
POL	Text	Porosity Location
POS	Text	Porosity Score
CD	Text	Cortical Defects

A.1.12 Recording of Dentition for Adults

Field Name	Data Type	Description
ID	Text	Skeleton
No	Number	Tooth
Pr	Number	Presence
WrS	Number	Wear Score
Clc	Number	Calculus Score
HY	Number	Hypoplasia
CT	Number	Caries Type
CS	Number	Caries Size
AB	Number	Abcess
GRN	Number	Granuloma
PD	Number	Periodontal Disease

A.1.13 Recording of Dentition for Sub-Adults

Field Name	Data Type	Description
ID	Text	Skeleton
No	Number	Tooth (Primary)
MX	Number	Tooth (Secondary)
Pr	Number	Presence
WrS	Number	Wear Score
Clc	Number	Calculus Score
HY	Number	Hypoplasia
CT	Number	Caries Type

Field Name	Data Type	Description
CS	Number	Caries Size
AB	Number	Abcess
GRN	Number	Granuloma
PD	Number	Periodontal Disease

A.1.14 Pathology

Field Name	Data Type	Description
ID	Text	Skeleton
Location	Text	Pathology Location
Side	Text	Side
Appearance	Text	Description of Appearance
Diagnosis?	Text	Differential Diagnosis, if possible
Image	Attachment	Images of pathology as attachment

A.1.15 The Linked Fields in Access 2007

Figure A.1 visualises how data fields A1.1 through A1.14 connect to one another in the Access database.

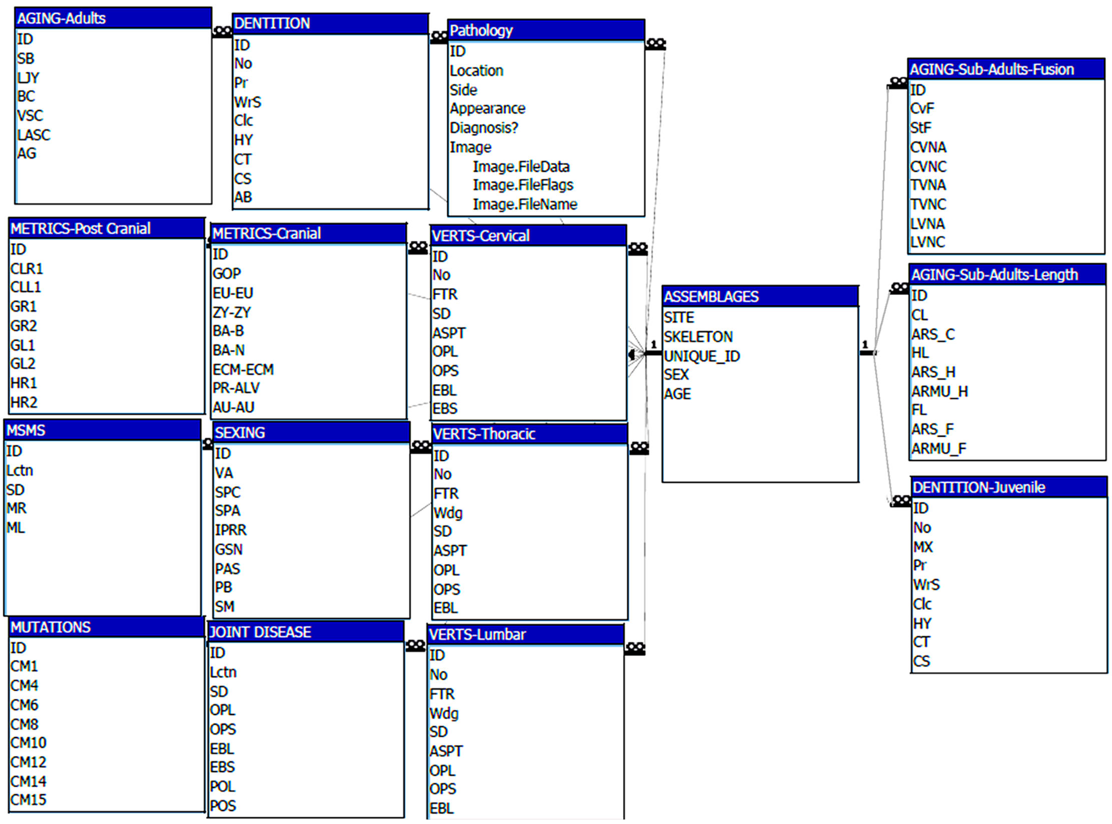

Figure A.1, Visualisation of each data field and their connections in the Access database.

A.2 Methods: Further Specifications

The following sections give additional information about the methods used in the osteological analysis in this research.

A.2.1 Fusion of the Clavicle:

The medial epiphysis of the clavicle is one of the last to fuse (Baker *et al* 2009: 97). Table A.1 gives the individual criteria used for estimating age. Figure A.2 illustrates the appearance of the epiphysis at the stages of fusion.

State of Fusion	Bass 2005	Gray 2000	Schaefer *et al* 2009
None	<21	<18	<21
Partial	12-25	18-25	24-29
Full	25+	25+	26+

Table A.1, Standards Used for Estimating Age from the Clavicle. Units are in Years.

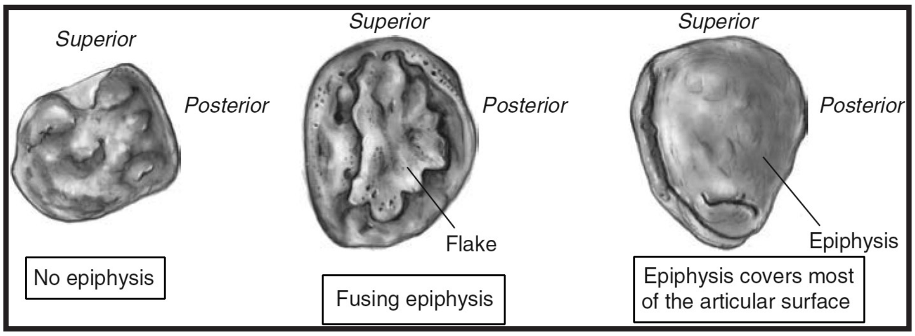

Figure A.2, Fusion of the Medial End of the Clavicle (Modified from Schaefer *et al* 2009: 141).

A.2.2 Fusion of the Sacral Vertebrae

The sacrum ossifies from ~21 different centres (Scheuer *et al* 2000: 206). The fusion of the sacral vertebrae (one to another) was used in age estimation. Table A.2 gives the fusion times. Figure A.3 shows the segments.

State of Fusion	4 & 5	3 & 4	2 & 3	1 & 2
None	<12[1], <12-14[2]	<13[1], <13-14[2]	<15-16[1], <14[2]	<20[1], <25[2]
Full	12+[1], 12-14+[2]	13+[1], 13-14+[2]	15-16+[1], 14+[2]	20+[1], 25+[2]

Table A.2, Standards Used for Estimating Age from the Sacrum
([1]Baker *et al* 2005: 83-86, [2]Schaefer *et al* 2009: 110-22).

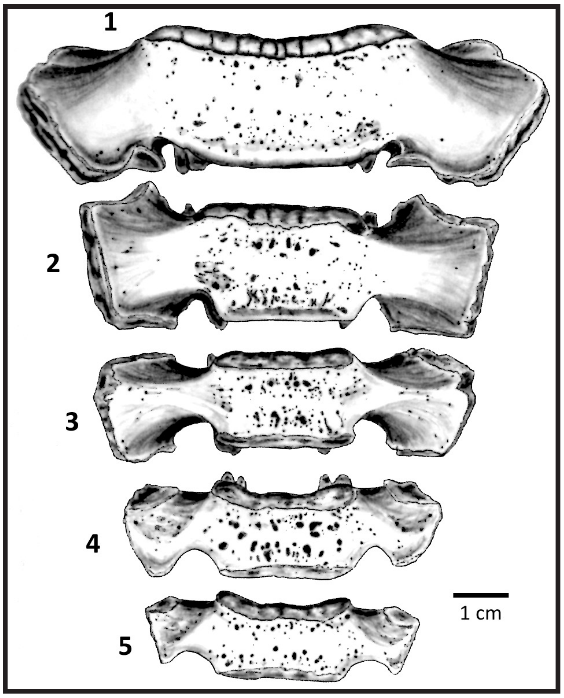

Figure A.3,

Fusion of the Bones of the Sacrum (Modified from Baker *et al* 2005: 85).

A.2.3 Fusion of the Spinal Vertebrae

Spinal vertebrae develop from three centres: the body and the two halves of the neural arch (Baker *et al* 2005: 75-92, Schaefer *et al* 2009: 97-122). Figure A.4 illustrates fusion. Table A.3 gives the criteria for age estimation.

	Cervical		Thoracic		Lumbar	
Fusion State	**Neural Arch**	**Centrum**	**Neural Arch**	**Centrum**	**Neural Arch**	**Centrum**
None	<2[12]	<3[12]	<1[1]	<3[1], <4[2]	<1[12]	<2-3[1], <2-4[2]
Full	2-4[1], 2-3[2]	3-4[12]	1-3[1], 1+[2]	3-6[1], 4-5[2]	1-5[12]	2-3>[1], 2-4>[2]

Table A.3, Standards for Estimating Age from the Vertebrae. Units are in Years. ([1]Baker *et al* 2005: 78-82, [2]Schuer *et al* 2000: 192-206).

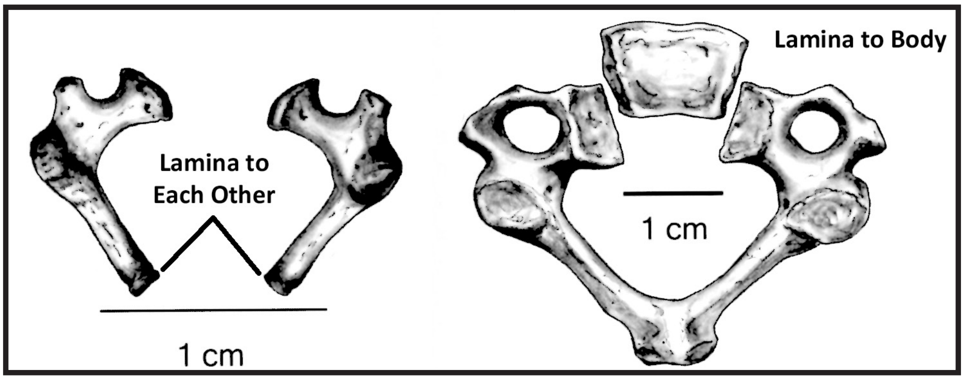

Figure A.4, Fusion of the (Cervical) Vertebrae (Modified from Baker et al 2005: 79).

A.2.4 Fusion of the Humerus

Between the ages of two to six years, the ossification centres at the proximal end of the humerus fuse (Baker *et al* 2005: 103-6, Scheuer *et al* 2000: 285). It is the fusion of this part of the humerus which was used in subadult ageing (Fg A.5). Table A.4 gives the criteria used to estimate age.

State of Fusion	Capitulum & Trochlea	Head to Diaphysis
None	<10-14[1], <10 males & <12 females[2]	<16-20 males & <13-17 females[2]
Full	10-14+[1], 10+ males & 12+ females[2]	16-20+ males & 13-17+ females[2]

Table A.4, Standards Used for Estimating Age from the Humerus
([1]Baker *et al* 2005: 103-6, [2]Scheuer *et al* 2000: 278-89).

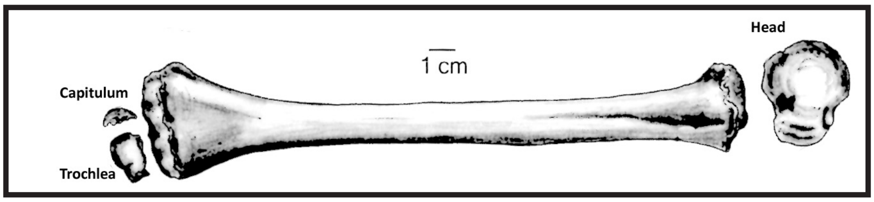

Figure A.5, Fusion of the Bones of the Humerus (Modified from Baker *et al* 2005: 105).

A.2.5 Fusion of the Radius

Only fusion of the radial head was used in age estimation and this begins during puberty. Table A.5 gives the specific criteria used in ageing. Figure A.6 illustrates the ossification centres of the radius.

State of Fusion	Head to Diaphysis
None	<14-17 males & <11-15 females[1], <14-17 males & <11.5-13 females[2]
Full	14-17+ males & 11-15+ females[1], 14-17+ males & 11.5-13+ females[2]

Table A.5, Standards to Estimate Age from the Radius
([1]Baker *et al* 2005: 108, [2]Scheuer *et al* 2000: 295).

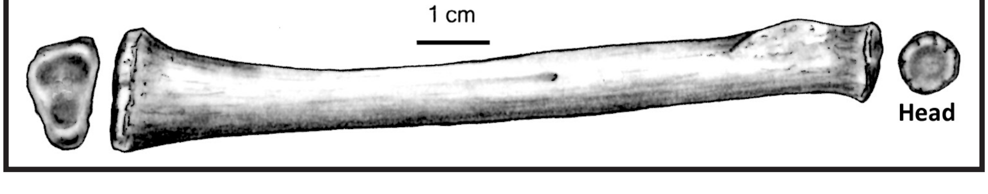

Figure A.6, Fusion of the Head of the Radius (Modified from Baker *et al* 2005: 107).

A.2.6 Fusion of both Proximal and Distal Femoral Epiphyses

The femur develops from five centres (Baker *et al* 2005: 112). Table A.6 gives the specific criteria used. Figure A.7 illustrates the epiphyses.

Feature	State of Fusion	Males	Females
Head	None Full	<15 15-24	<14 14-22
Trochanters	None Full	<16 16-21	<12 12-19
Distal Condyles	None Full	<16 16-21	<14 14-19

Table A.6, Standards Used to Estimate Age from the Femur (Schaefer *et al* 2009: 275).

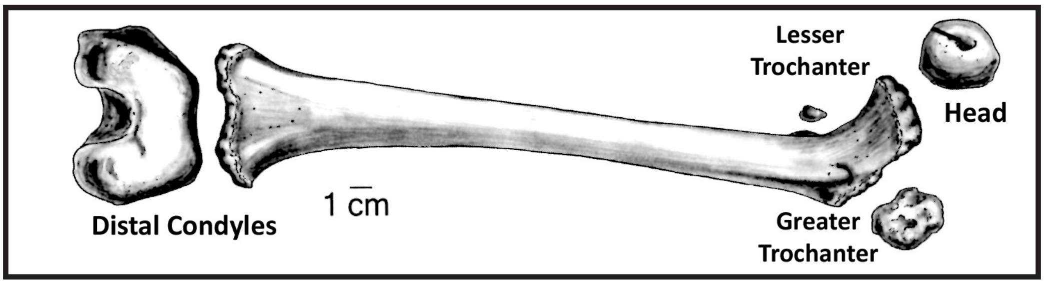

Figure A.7, Fusion of the Bones of the Femur (Modified from Baker *et al* 2005: 113).

A.2.7 Fusion of the Basilary Suture

At the base of the skull is the spheno-occipital synchondrosis, or basilary suture. Figure A.8 illustrates the location of this suture. Table A.7 gives the criteria used to age juveniles from basilary fusion.

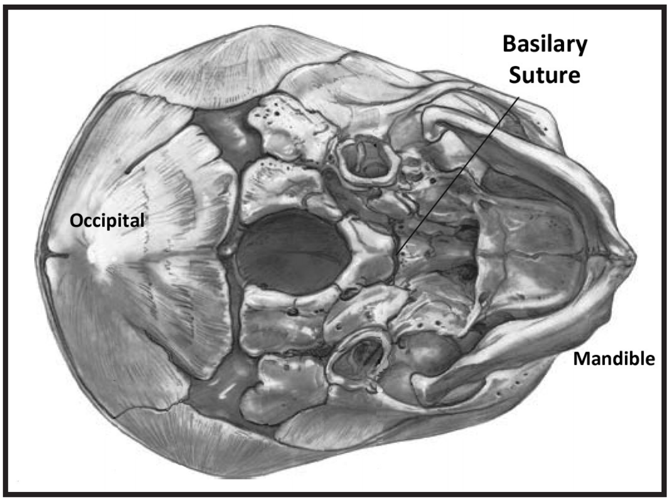

Figure A.8

The Location of the Basilary Suture (Schaefer *et al* 2009: 12).

State of Fusion	Males	Females
None	<13-18	<11-16
Full	13-18+	11-16+

Table A.8, Standards Used to Estimate Age from the Basilar Suture (Schaefer *et al* 2009: 15).

A.2.8 Fusion of the Occiput

At birth, the occipital bone is in four parts: squama, basilar, and laterals. The fusion of these into one was used to estimate age (Table A.8, Fg A.9).

State of Fusion	to Squama	to Basilar
None	<4[1], <2-6[2]	<7[1], <3-8[2]
Full	4+[1], 2-6+[2]	7+[1], 3-8+[2]

Table A.8, Standards to Estimate Age from the Occiput
([1]Baker *et al* 2005: 34, [2]Schaefer *et al* 2009: 14-5).

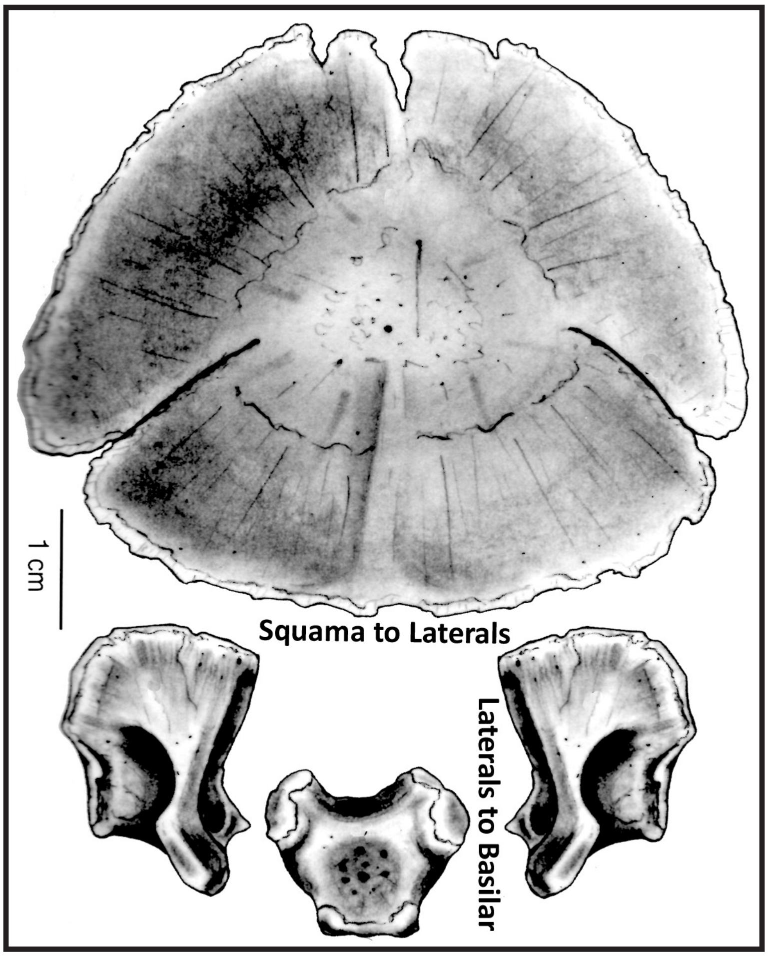

Figure A.9, Pieces of the Occiput. Fusion Sites Indicated (Modified from Baker *et al* 2005: 35).

A.2.9 Fusion of the Innominate

At birth, the innominate is three bones: the ilium, ischium and pubis. Two areas of fusion were used in the estimation of age, the fusion of the ischium and pubis to form the ischiopubic ramus, and the fusion of the iliac crest. Figure A.10 illustrates the three bones of the innominate and the fusion sites used for ageing. Table A.9 gives the specific criteria used in estimating age from these epiphyses.

State of Fusion	Iliac Crest	Ischium & Pubis
None	<17-23[1], <14-23[3]	<4-8[1], <5-16[2]
Full	17-23+[1], 14-23+[3]	4-8+[1], 5-16+[2]

Table A.9, Standards Used to Estimate Age from the Innominate
([1]Baker *et al* 2005: 89-91, [2]Schaefer *et al* 2009: 253, [3]Webb and Suchey 1985).

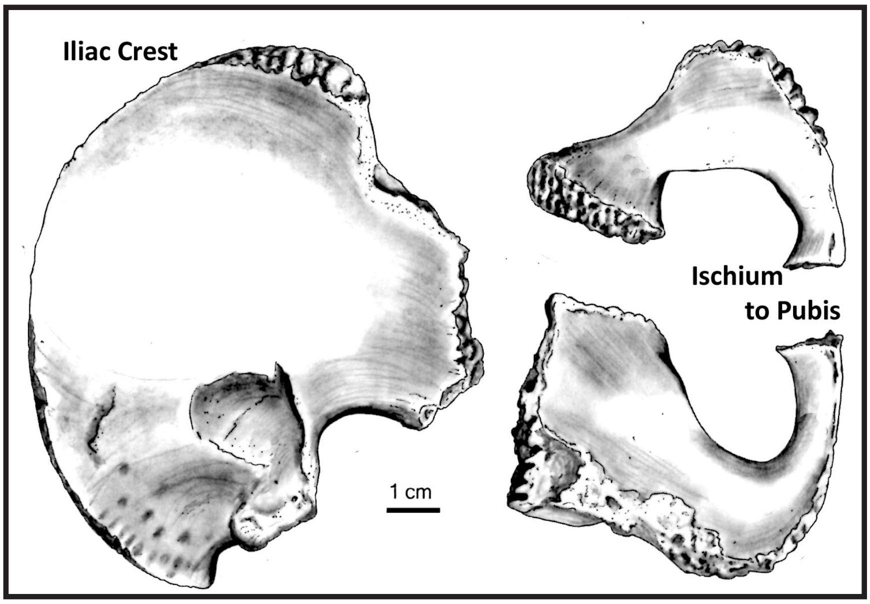

Figure A.10, Fusion of the Bones of the Innominate (Modified from Baker *et al* 2005: 88).

A.2.10 Ageing Juveniles from Bone Metrics

Metric methods used were based on Sundick (1978) and are the standard method used by the BARC Labs. These measurements, and the corresponding age estimations, are given in Table A.10. Long bones were measured without epiphyses. The ilium was measured at the widest point.

Element	Metrics in mm (Mean)	Age
Ilium	46	0-6 mos
	-	6-15 mos
	52	15-24 mos
	-	24-30 mos
	64-69 (67.3)	30-42 mos
	69-79 (75.3)	42-54 mos
	84	4.5-5.5 yrs
	87-100 (92.8)	5.5-6.5 yrs
	82-96 (89)	6.5-8 yrs
	103-118 (110.3)	8-10.5 yrs
	103	10.5-11 yrs
	105-111 (108.8)	11-12 yrs
Clavicle	51	0-15 mos
	66	15-24 mos
	-	24-30 mos
	70	30-42 mos
	75-80 (76.7)	42-54 mos
	-	4.5-5.5 yrs
	87-96 (90.7)	5.5-6.5 yrs
	87-102 (92.3)	6.5-8 yrs
	101-8 (104.5)	8-10.5 yrs
	110	10.5-11 yrs
	102-110 (106)	11-12yrs
Humerus	78	0-6 mos
	81-110 (95.5)	6-15 mos
	125	15-24 mos
	-	24-30 mos
	128-135 (130.7)	30-42 mos
	139-160 (149.2)	42-54 mos
	179	4.5-5.5 yrs
	175-197 (186.3)	5.5-6.5 yrs
	177-216 (189.8)	6.5-8 yrs
	203-225 (212.7)	8-10.5 yrs
	245	10.5-11 yrs
	220-227 (222.7)	11-12 yrs

Table A.10, Metric Methods used in Aging Juveniles from Sundick 1978.

Element	Metrics in mm (Mean)	Age
Femur	93	0-6 mos
	-	6-15 mos
	162	15-24 mos
	165	24-30 mos
	168-169 (168.7)	30-42 mos
	176-221 (200.2)	42-54 mos
	202-249 (222.3)	4.5-5.5 yrs
	226-277 (250)	5.5-6.5 yrs
	243-299 (264.5)	6.5-8 yrs
	278-323 (293.8)	8-10.5 yrs
	325	10.5-11 yrs
	316-336 (323.3)	11-12 yrs
Tibia	-	0-6 mos
	-	6-15 mos
	127	15-24 mos
	127-129 (128)	24-30 mos
	132-141 (136.5)	30-42 mos
	152-159 (156.3)	42-54 mos
	164-209 (182)	4.5-5.5 yrs
	181-223 (205.6)	5.5-6.5 yrs
	194-242 (213)	6.5-8 yrs
	217-257 (236.2)	8-10.5 yrs
	268	10.5-11 yrs
	256-272 (263)	11-12 yrs

A.2.11 Adult Ageing from the Pubic Symphysis

Figure A.11 illustrates the phases from the Brooks and Suchey (1990) method for estimating age for adult skeletons using the pubic symphysis. Descriptions of the phases which follow have been modified from the Brooks and Suchey (1990) article.

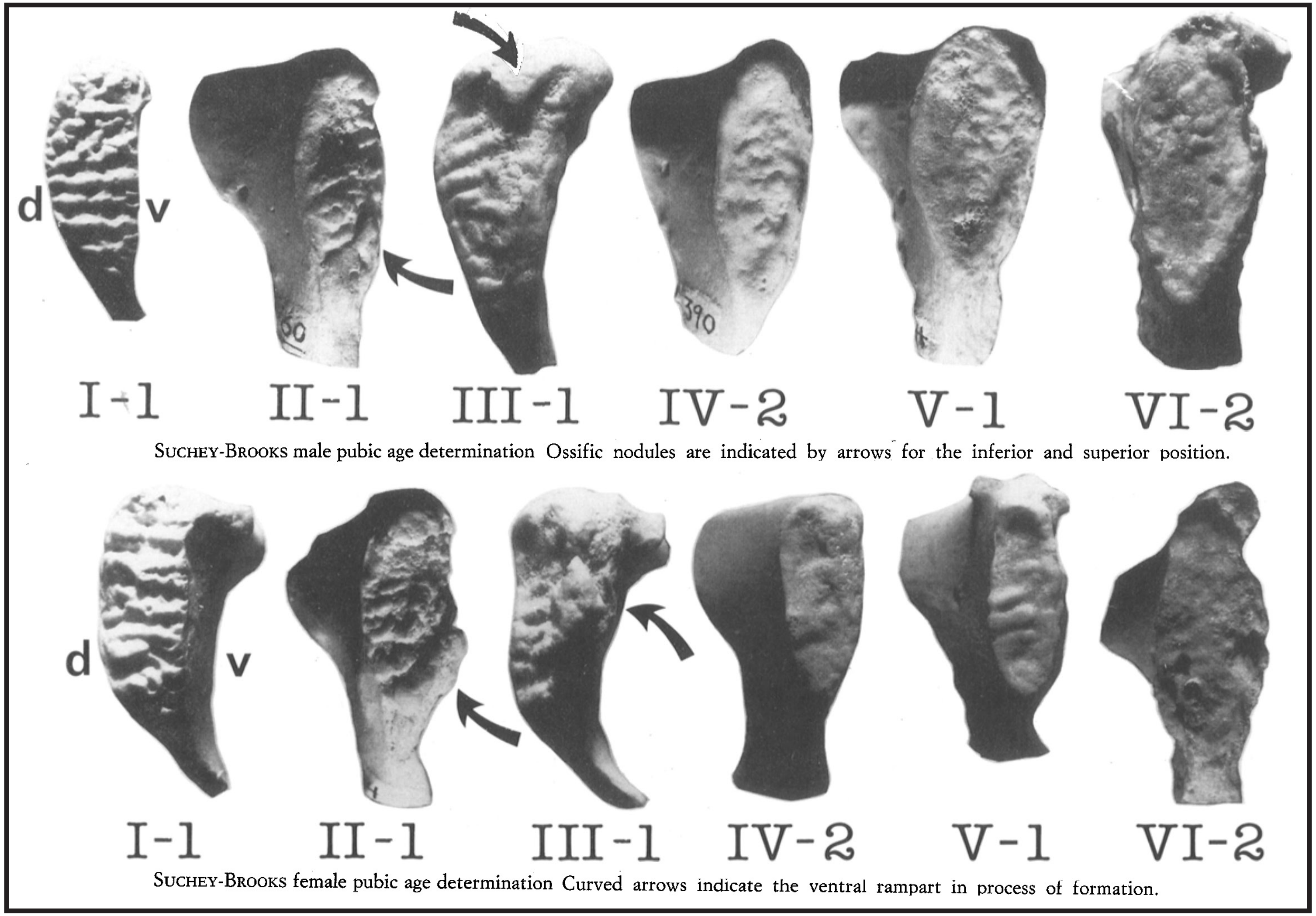

Figure A.11, Age Determination from the Pubis. All are from the Left Side with d=Dorsal and v=Ventral. (Modified from Brooks and Suchey 1990: 122-3).

Phase I

Face has ridges and furrows which often extend to the pubic tubercle. The ridges are well-marked and anterior bevelling may be starting. Bony nodules may occur; however, the lack of delimitation defines this phase.

Phase II

The symphyseal face may still show ridges and furrows. The face has the beginnings of delimitation. The ventral rampart may be starting to form.

Phase III

The ventral rampart is forming, mainly on the inferior side; although, there can be bony nodules fusing on the superior end. The face can be smooth or may still show ridges. The posterior plateau is complete. Lipping of the dorsal margin is absent and there are no bony ligamentous outgrowths.

Phase IV

The face is generally fine grained; however, ridging may still remain. The oval outline is complete at this stage; although, a hiatus can occur in the antero-superior rim. The pubic tubercle is fully separated from the face. Bony ligamentous outgrowths may occur on inferior portion of the anterior pubis, adjacent to face. Any lipping will be slight and located on the posterior border.

Phase V

The face is completely rimmed with a slight depression in relation to the rim. There is little to no rim erosion. Moderate lipping is usually found on the posterior border with more prominent outgrowths on the anterior border.

Phase VI

The symphyseal face may exhibit a greater depression. Anterior ligamentous attachments are marked. There is definite rim erosion. The pubic tubercle may be separate from the face. The face may be pitted or porous, have an irregular shape, and crenellations may occur.

Age Ranges from the Phasing

The above descriptions and images of symphyseal phasing were compared to the symphyses in this study. Once a determination of phase was made, the age ranges given in Fg A.12 were entered into the database.

Phase	Female (n=273)			Male (n=739)		
	mean	S.D.	95% range	mean	S.D.	95% range
I	19.4	2.6	15-24	18.5	2.1	15-23
II	25.0	4.9	19-40	23.4	3.6	19-34
III	30.7	8.1	21-53	28.7	6.5	21-46
IV	38.2	10.9	26-70	35.2	9.4	23-57
V	48.1	14.6	25-83	45.6	10.4	27-66
VI	60.0	12.4	42-87	61.2	12.2	34-86

Figure A.12, Age Ranges for the Pubic Symphyseal Phasing (Brooks and Suchey 1990: 233).

A.2.12 The Lovejoy Method of Age Estimation

Figure A.13 illustrates the features used in the Lovejoy method for ageing from the auricular surface. The specific descriptions of each stage are given in temporal age groups (in years) below. These descriptions were modified from the Lovejoy *et al* (1985) article. Images of these stages are also available in the afore mentioned article; however, they are too numerous to reproduce here.

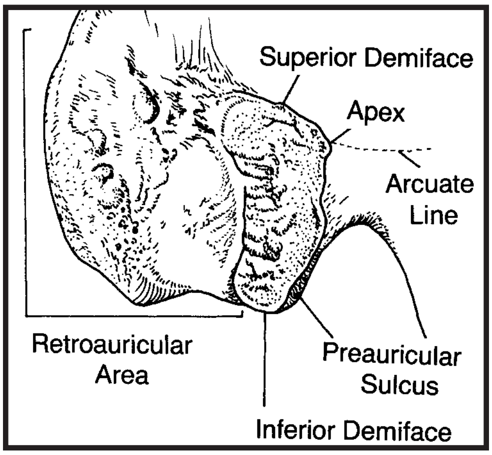

Figure A.13, Locations on the Auricular Surface used in Age Estimation (Lovejoy *et al* 1985: 18).

Age 20-24

The surface displays fine granular texture and marked transverse organization. There is no retro-auricular activity, apical activity, or porosity. The surface is youthful with broad and well-defined billows, covering most or all of the surface. Any subchondral defects are smooth-edged and rounded.

Age 25-29

There is a moderate loss of billowing with replacement by striae. Transverse organisation is marked. There is no apical activity, porosity, or retroauricular activity. Granulation is slightly more coarse.

Age 30-34

Billowing is greatly reduced with replacement by striae and a loss of transverse organisation. The surface is more coarsely grained with possible small areas of microporosity. Slight retroauricular activity may occasionally be present, but there are no significant changes at apex.

Age 35-39

The face is coarsely and uniformly granulated, with little billowing and striae. Transverse organization is poorly defined, microporosity is slight, and there is no macroporosity. There is a little activity in the retroauricular area. There are minimal changes at the apex.

Age 40-44

There is no billowing and if striae are present, they are vague. The face is partially granular; however, densification has begun. There is a marked loss of transverse organization. Some increase in microporosity is seen. Although, not typical, macroporosity can occur. Slight changes are common at the apex.

There is slight to moderate activity in the retroauricular area.

Age 45-49

There is a significant loss of granulation with replacement by dense bone. There are no billows or striae and no transverse organisation. Most or all porosity is lost to the densification process. Margins are increasingly irregular. Apical changes are slight to moderate with moderate retroauricular activity.

Age 50-60

Surface irregularity increased. inferior face generally lipped at terminus. Apical changes may be marked. Margin irregularity is common. Macroporosity sometimes present. Retroauricular activity moderate to marked.

Age 60+

The paramount feature is an irregular surface with obvious signs of subchondral destruction. Macroporosity is present in about one-third of all cases. Apical activity is generally marked but is not always present. Margins are dramatically irregular and lipped. The retroauricular area generally contains osteophytes of low to moderate relief.

A.2.13 The Buckberry-Chamberlain Method of Age Estimation

The Buckberry-Chamberlain method for ageing from the auricular surface uses the same features in Fg A.13. The specific diagnostic criteria follows and has been modified from Buckberry and Chamberlain (2002).

Transverse Organization

Transverse organization refers to the billows and striae that run mediolaterally on the auricular surface. Scoring is estimated by eye (Fg A.14).

Score	Description
1	90% or more of surface is transversely organized
2	50–89% of surface is transversely organized
3	25–49% of surface is transversely organized
4	Transverse organization is present on less than 25% of surface
5	No transverse organization is present

Figure A.14, Transverse Organisation Scoring (Buckberry and Chamberlain 2002: 233).

Surface Texture

The auricular surface is finely grained in early life, becoming coarser and denser over time. Finely granular bone has grains generally less than 0.5 mm in diameter. Coarsely granular bone consists of grains generally over 0.5 mm in diameter. Dense bone refers to appearance, not amount, and is defined as compact and smooth nodules or areas with no surface granularity (Fg A.15).

Score	Description
1	90% or more of surface is *finely granular*
2	50–89% of surface is *finely granular*; replacement of finely granular bone by coarsely granular bone in some areas; no dense bone is present
3	50% or more of surface is *coarsely granular*, but no dense bone is present
4	*Dense bone* is present, but occupies less than 50% of surface; this may be just one small nodule of dense bone in very early stages
5	50% or more of surface is occupied by *dense bone*

Figure A.15, Scoring System for Surface Texture (Buckberry and Chamberlain 2002: 233).

Microporosity

Microporosity is porosity of the surface or subchondral bone having a diameter less than 1 mm. Microporosity may be localized or spread across large areas of either auricular face or on both faces (Fg A.16).

Score	Description
1	No microporosity is present
2	Microporosity is present on one demiface only
3	Microporosity is present on both demifaces

Figure A.16, Scoring System for Microporosity (Buckberry and Chamberlain 2002: 233).

Macroporosity

Holes greater than 1 mm in diameter are classified as macroporosity. It may also be localized or spread across large areas. Macroporosity is scored by presence on either or both faces of the auricular surface (Fg A.17).

Score	Description
1	No macroporosity is present
2	Macroporosity is present on one demiface only
3	Macroporosity is present on both demifaces

Figure A.17, Scoring System for Macroporosity (Buckberry and Chamberlain 2002: 234).

Apical Changes

The apex of the auricular surface can develop osteophytes or lipping. This can alter the contour of the surface. Scoring is given in Fg A.18.

Score	Description
1	Apex is sharp and distinct; auricular surface may be slightly raised relative to adjacent bone surface
2	Some lipping is present at apex, but shape of articular margin is still distinct and smooth (shape of outline of surface at apex is a continuous arc)
3	Irregularity occurs in contours of articular surface; shape of apex is no longer a smooth arc

Figure A.18, Scoring System for Apex Changes (Buckberry and Chamberlain 2002: 234).

Final Scoring

Once scores are determined for the features listed above, these scores are added together to get a composite score and an age estimation (Fg A.19).

Composite score	Stage	Mean age	Standard deviation	Median age	Range
5–6	I	17.33	1.53	17	16–19
7–8	II	29.33	6.71	27	21–38
9–10	III	37.86	13.08	37	16–65
11–12	IV	51.41	14.47	52	29–81
13–14	V	59.94	12.95	62	29–88
15–16	VI	66.71	11.88	66	39–91
17–19	VII	72.25	12.73	73	53–92

Figure A.19, Age Estimates from Composite Scores (Buckberry and Chamberlain 2002: 237).

A.2.14 Age Estimation from the 1st Rib

DiGangi *et al* (2009) found two features on the 1st rib which were diagnostic for age estimations: the costal face and tubercle facet. These features are scored and then combined to form phases which correlate to age ranges. What follows is criteria for determining phases from the costal face and tubercle facet, and the age ranges for each phase combination.

Changes to the Coastal Face:

Stage 1: Costal face has a narrow, oval shape with a surface that is flat, shallow, and marked with ridges (Fg A.20).

Figure A.20,

Costal Face Stage 1:
(a) Narrow, Oval, Shallow with Ridges—Male,16 yrs.
(b) Narrow, Oval, Flat Surface—Male, 25 yrs.

(Modified from DiGangi *et al* 2009: 172).

Stage 2: Face shape remains narrow and oval, with a developing U-shape. The surface is slightly concave and ridges are now absent (Fg A.21).

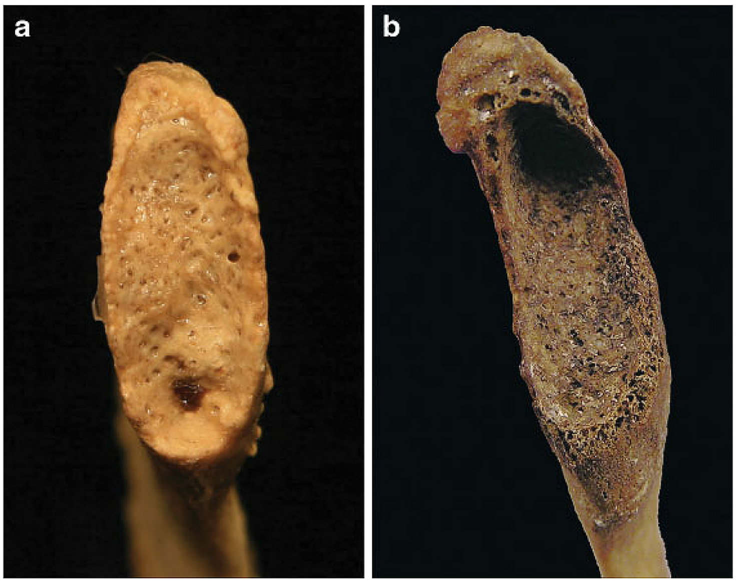

Figure A.21,

Costal Face Stage 2:
(a) Narrow, Oval, Concave, No Ridges—Male, 26 yrs.
(b) Narrow, Oval, Concave, No Ridges—Male, 41 yrs.

(Modified from DiGangi *et al* 2009: 172).

Stage 3: Characterised by the widening U-shape which may be circular in appearance. Concavity of the face may be marked at this stage (Fg A.22).

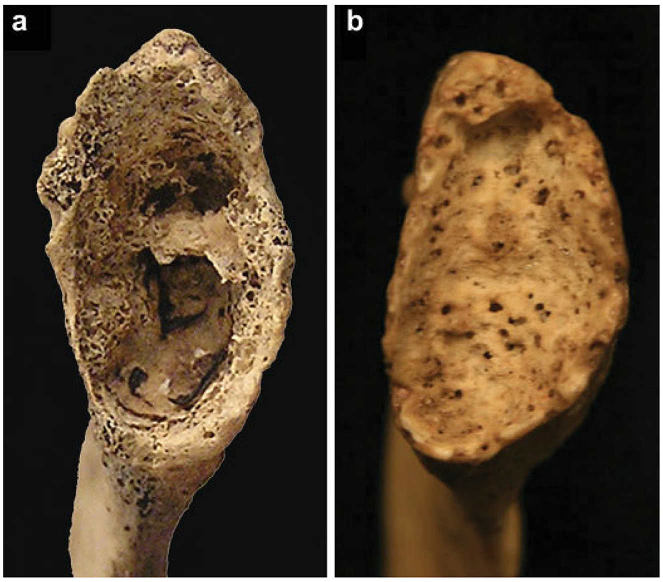

Figure A.22,

Costal Face Stage 3:
(a) Circular, Concave—Male, 34 yrs
(b) Wide U-shape, Concave—Male, 34 yrs

(Modified from DiGangi *et al* 2009: 173).

Stage 4: Face shape is irregular. Bony growths may be evident. Ossification of the cartilage has begun and forms a hollowed shell or cavity (Fg A.23).

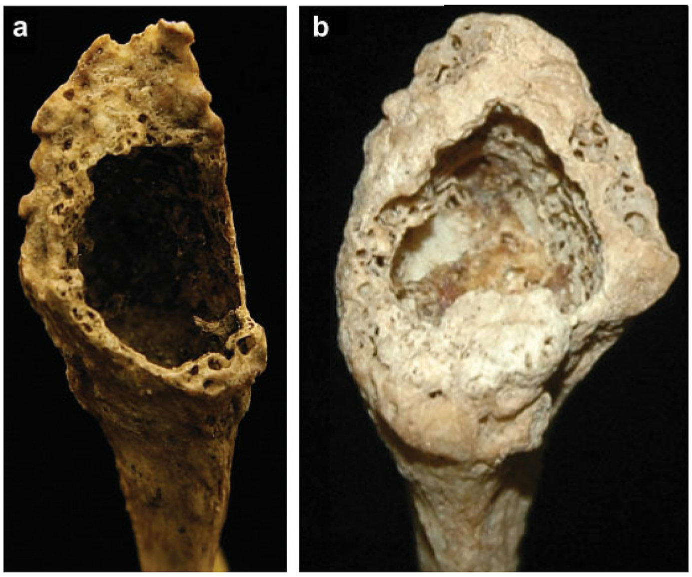

Figure A.23,

Costal Face Stage 4:
(a) Irregular Shape, Hollowed—Male, 54 yrs.
(b) Irregular Shape, Hollowed—Male, 77 yrs.

(Modified from DiGangi *et al* 2009: 173).

Stage 5: The concavity is filled with bony growths that may be convex in appearance. The cavity and shape of the costal face are irregular (Fg A.24).

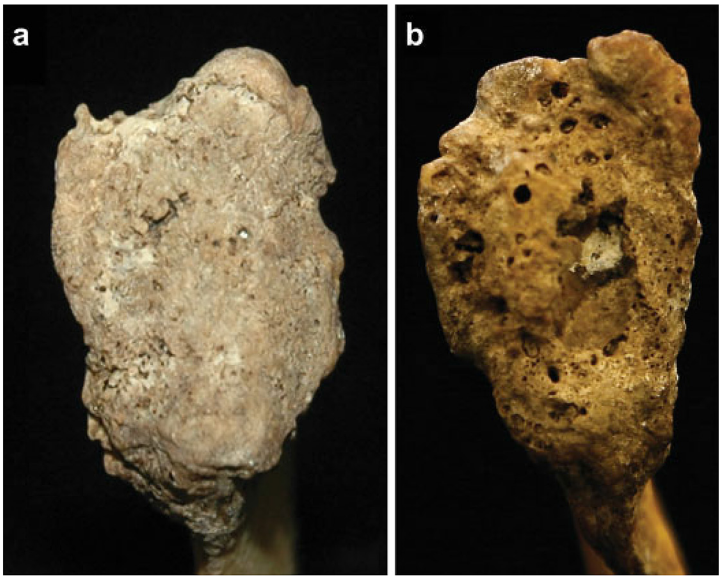

Figure A.24, Costal Face Stage 5: (a) Cavity Filled with Irregular Texture—Male, 76 yrs
(b) Cavity Filled with Irregular Texture—Male, 76 yrs (Modified from DiGangi *et al* 2009: 174).

<u>Changes to the Tubercle Facet</u>:

Stage 1: Facet is convex and rounded with a dense yet smooth texture (Fg A.25).

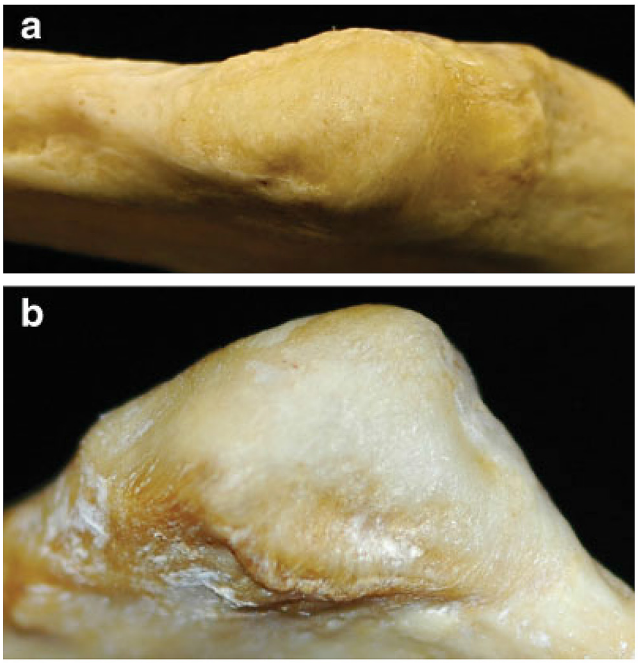

Figure A.25,

Tubercle Stage 1:
(a) Dense and Smooth—Male, 24 yrs
(b) Dense and Smooth—Male, 24 yrs

(Modified from
DiGangi *et al* 2009: 174)

Stage 2: Surface is depressed, undulating, and may have a slight 'pockmark-like' pitting (Fg A.26).

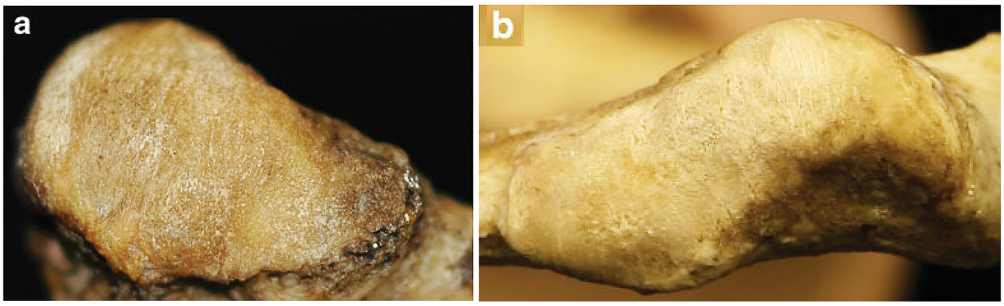

Figure A.26, Examples of Tubercle Stage 2: (a) Depressed and Irregular—Male, 61 yrs
(b) Depressed and Irregular—Male, 43 yrs (Modified from DiGangi *et al* 2009: 174).

Stage 3: Pitting is now microporosity, defined as penetrating pores <1 mm in diameter (Fg A.27).

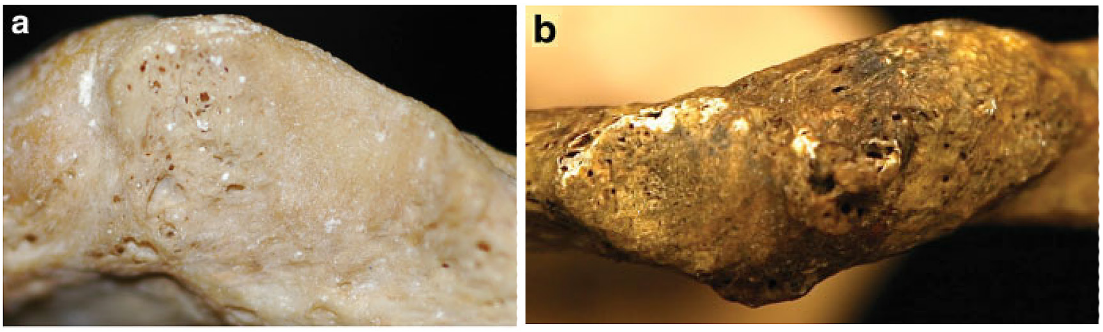

Figure A.27, Tubercle Stage 3: (a) Microporosity—Male, 49 yrs
(b) Microporosity—Male, 76 yrs (Modified from DiGangi *et al* 2009: 175).

Stage 4: Includes lipping and/or macroporosity, defined as pores >1 mm in diameter which penetrate the surface of the bone (Fg A.28).

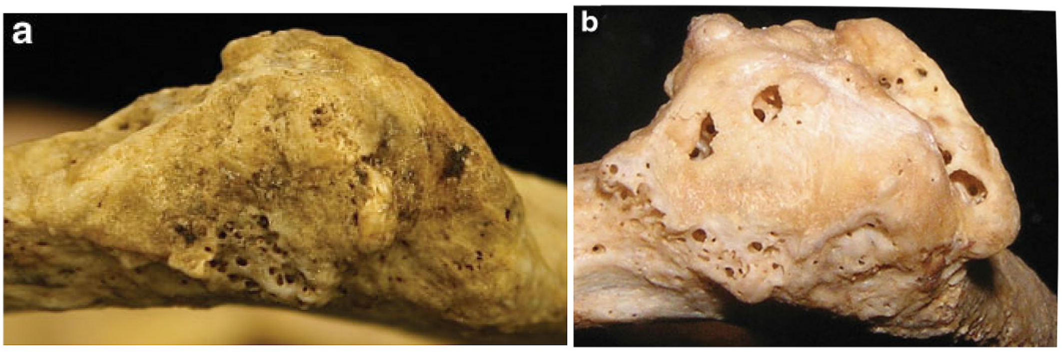

Figure A.28, Tubercle Stage 4: (a) Lipping and Porosity—Male, 83 yrs
(b) Extensive Porosity and Lipping—Male, 61 yrs (Modified from DiGangi *et al* 2009: 175).

Combining Stages to Estimate Age:

Once the stages have been assessed, they are combined and then compared to the table in Figure A.29 to estimate the individual's age at death.

CF	TF	Lower 95%	Lower 50%	Best Point	Upper 50%	Upper 95%
1	1	[12]	[12]	[12]	18.24	39.51
2	1	[12]	[12]	15.10	23.40	50.58
3	1	[12]	13.72	20.19	29.65	57.71
4	1	[12]	21.27	30.46	42.79	66.73
5	1	19.73	37.74	49.45	60.82	79.20
1	2	[12]	[12]	16.34	24.28	51.86
2	2	[12]	17.78	25.26	35.93	61.21
3	2	12.90	23.10	32.07	43.90	67.29
4	2	17.89	33.11	43.95	55.59	75.76
5	2	26.96	46.27	57.26	67.44	83.56
1	3	[12]	14.58	21.29	31.02	58.32
2	3	12.74	22.74	31.59	43.35	66.80
3	3	16.01	29.20	39.34	51.17	72.80
4	3	21.75	39.13	50.23	61.18	79.31
5	3	30.85	50.35	60.87	70.49	85.67
1	4	[12]	21.15	30.31	42.81	67.08
2	4	17.17	32.06	42.98	54.87	75.49
3	4	21.33	38.94	50.26	61.35	79.53
4	4	27.84	47.45	58.39	68.43	84.24
5	4	36.81	56.34	66.19	75.05	88.99

"Best point" is the age with the highest posterior density. "Lower" and "Upper" refer to the bounds for the stated highest posterior density regions. Ages in brackets occur on boundaries.

Figure A.29, Posterior Densities to Age from the 1st Rib (After DiGangi *et al* 2009: 170).

A.2.15 Age Estimation from the 4th Rib

İşcan *et al* (1984) also use stages (or phases) to assess age from the rib. This method uses the sternal end of the 4th rib. The following information on the methodology was taken from İşcan *et al* (1984).

Phase 0: The articular surface is flat or billowy with a regular rim and rounded edges. The bone itself is smooth, firm, and very solid (Fg A.30: 0a, b, and c).

Phase 1: Amorphous indentation has begun in the articular surface, but billowing may still be present. The rim is rounded and regular; however, scallops may appear. The bone is still firm, smooth and solid (Fg A.30: 1a, b, and c).

Phase 2: The pit is deeper with a V-shape. Walls are thick, smooth, with a scalloped rim and rounded edges. Bone is solid (Fg A.30: 2a, b, and c).

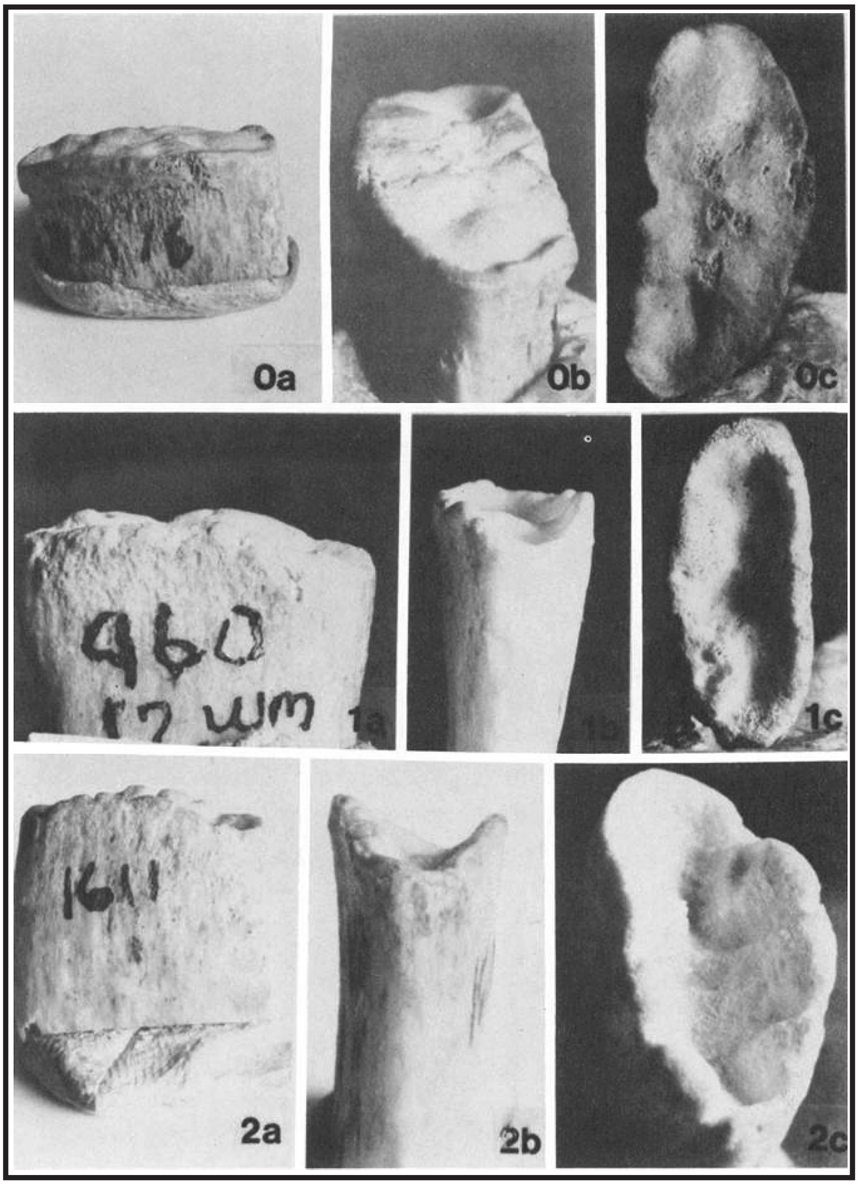

Figure A.30, The 4th Rib End Stages 0-2 (İşcan *et al* 1984: 1097).

Phase 3: Pit is a narrow to moderate U-shape. Thick walls with rounded edges. Irregular rim, possible scalloping. Firm, solid bone (Fg A.31: 3a, b, and c).

Phase 4: Pit depth increasing. Shape is narrow to semi-wide U. Walls are thinner, with rounded edges. Rim is irregular. Decrease in bone weight and

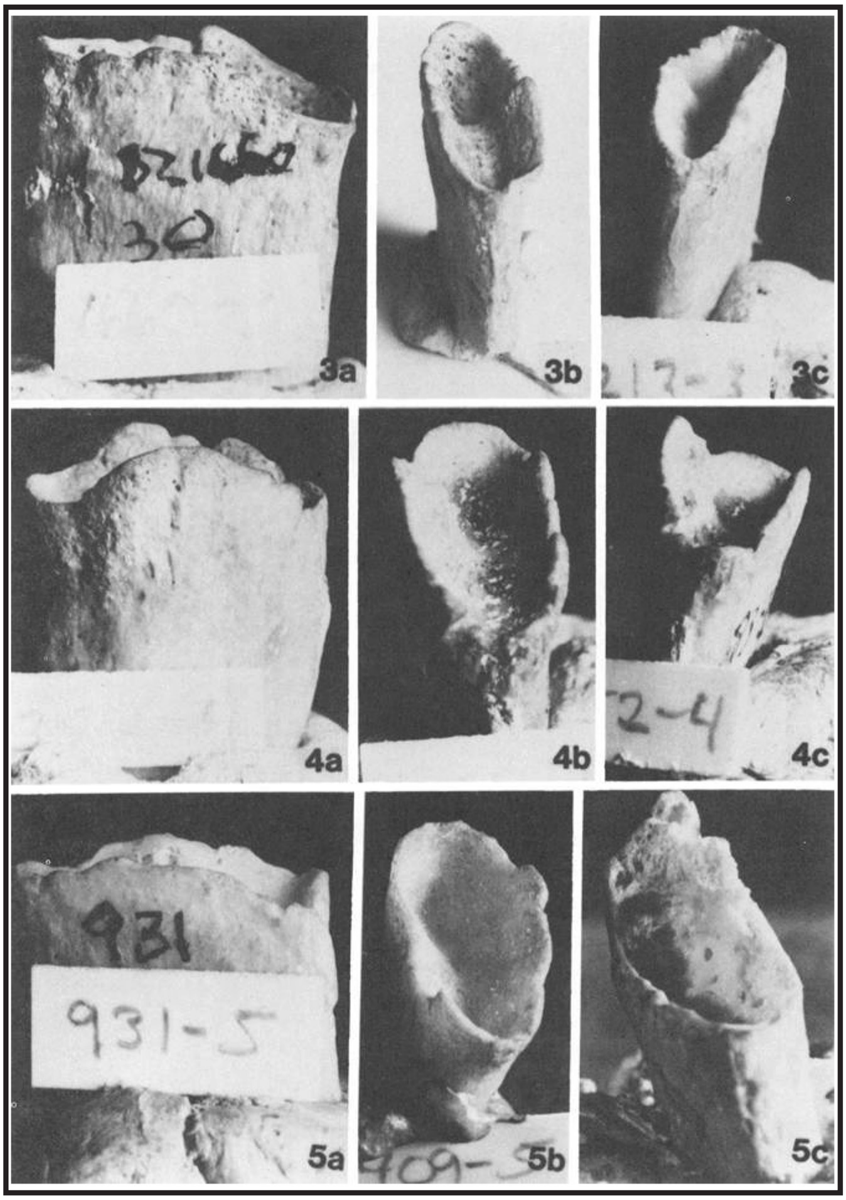

Figure A.31, 4th Rib End Stages 3-5 (İşcan *et al* 1984: 1098).

firmness (Fg A.31: 4a, b, and c).

Phase 5: The shape is a moderately wide U. Further thinning of walls and edges are becoming sharp. Rim irregularity increasing. Scalloping replaced with irregular bony projections. Bone is fairly good, however, there is some deterioration with porosity and loss of density (Fg A.31: 5a, b, and c).

Phase 6: The pit is deep with a wide U-shape. The walls are thin with sharp edges. The rim is irregular and exhibits some rather long bony projections that can be more pronounced at the superior and inferior borders. The bone is noticeably lighter in weight, thinner, and more porous (Fg A.32: 6a, b, and c).

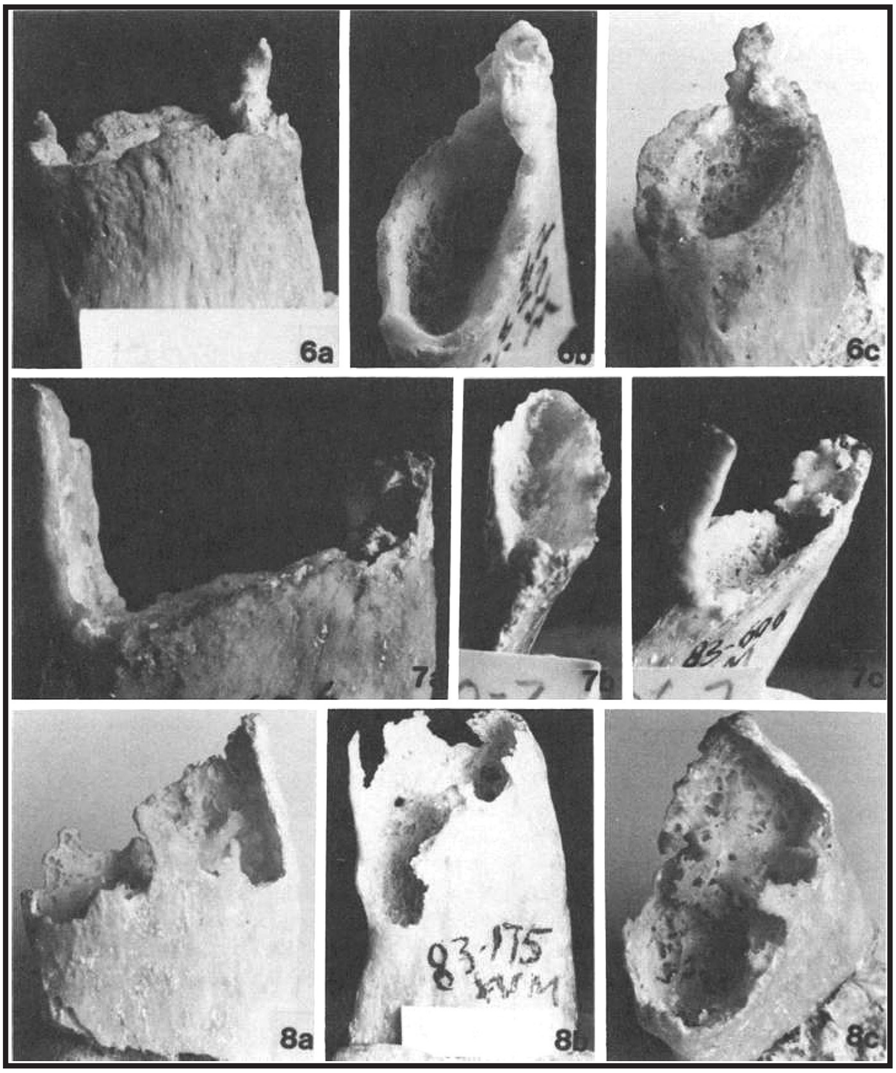

Figure A.32, 4th Rib End Stages 6-8 (İşcan *et al* 1984: 1100).

Phase 7: The pit is deep with a wide U-shape. The walls are thin and fragile with sharp, irregular edges and bony projections. The bone is lightweight and brittle with deterioration in quality and porosity (Fg A.32: 7a, b, and c).

Phase 8: The pit is deep and widely U-shaped. Walls are extremely thin, fragile, and brittle with sharp, irregular edges and bony projections. The bone is very lightweight, thin, brittle, friable, and porous. (Fg A.32: 8a, b, and c).

Once a rib phase was determined, it was then matched to the table seen in Figure A.33 and entered into the Access database.

Phase	*N*	Mean	SD	SE	95% Confidence Interval	Age Range
1	4	17.3	0.50	0.25	16.5–18.0	17–18
2	15	21.9	2.13	0.59	20.8–23.1	18–25
3	17	25.9	3.50	0.85	24.1–27.7	19–33
4	12	28.2	3.83	1.11	25.7–30.6	22–35
5	14	38.8	7.00	1.93	34.4–42.3	28–52
6	17	50.0	11.17	2.71	44.3–55.7	32–71
7	17	59.2	9.52	2.31	54.3–64.1	44–85
8	12	71.5	10.27	2.97	65.0–78.0	44–85
Total	108	41.0	7.51	0.72	39.6–42.4	17–85

Figure A.33, Age Estimates for the 4th Rib End Phases (İşcan *et al* 1984: 1101).

A.2.16 The Phenice Method

The Phenice Method for estimating skeletal sex was developed for the pubic bone (Phenice 1969). The features of interest are depicted in Fg A.34, and more specific criteria are listed below.

The Ventral Arc: This feature is a ridge of bone which extends from the pubic crest and arcs inferiorly across the ventral surface of the pubic bone to the lateral most extension of the subpubic concavity. This feature tends to be absent in males (Fg A.34: A, Female; B, Male).

The Subpubic Concavity: In females, inferior surface of the pubis tends to be greater—wider—theoretically to allow for childbirth. Thus the ischio-pubic ramus tends to be concave: curved ‘inward’ towards the postero-superior body (Fg A.34: C, Female; D, Male).

The Ischio-Pubic Ramus Ridge: The same ramus which is discussed above will also generally exhibit a wide medial aspect in males and a narrow one in females. Females also tend to have a ridge formation along this surface (Fg A.34: E, Female; F, Male).

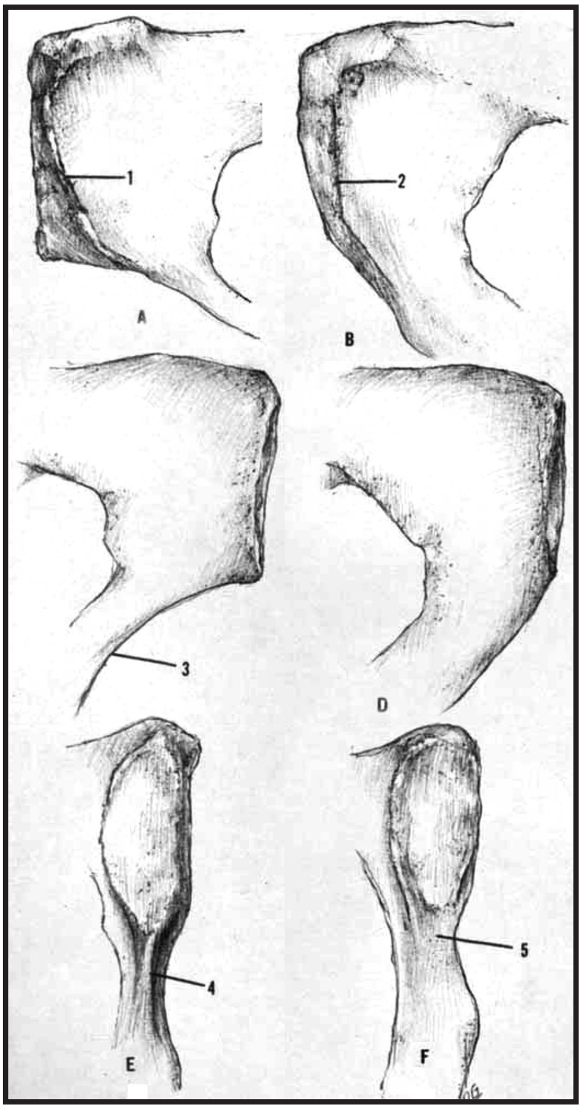

Figure A.34,

Criteria for Sexing from the Pubis.
Female: Left, Male: Right.

(Modified from Phenice 1969: 299).

A.2.17 Criteria for Sexing from the Skull

Below are methodological descriptions to aid in sexing skeletal remains from human skulls. This acts as a companion to section 5.3.3.4.

Nuchal Crest: Note the rugosity of the occipital in lateral view and compare to Figure 5.4. Note the rugosity of the nuchal attachment site and score.

Score 1: Minimal expression. The external surface of the occipital is smooth with no bony projections.

Score 5: Maximal expression. Nuchal crest projects well away from the surface of the bone with a well defined ledge or hook.

Mastoid Process: The most important variable to consider is the volume of the mastoid process, not its length. This should be in comparison to the surrounding features of the skull, not a specific metric size (Fg 5.4).

Score 1: Minimal expression. A very small mastoid process that projects only a small distance below the inferior margins of the external acoustic meatus and the digastric groove.

Score 5: Maximal expression. A massive mastoid process with lengths and widths several times that of the external acoustic meatus.

Supraorbital Margin: Compare the skull to the diagrams in Figure 5.4.

Score 1: Minimal expression. Extremely sharp, border feels like the edge of a dull knife.

Score 5: Maximal expression. A thick, rounded margin with a curvature that approximates that of a pencil.

Glabella/Supraorbital Ridge: Compare the lateral profile of the cranium to the diagrams in Figure 5.4.

Score 1: Minimal expression. The contour is smooth with little or no projection at glabella.

Score 5: Maximal expression. The glabella and/or supra-orbital ridge from a very large, rounded loaf-shaped projection.

Mental Eminence: Compare the anterior surface of the mandible to Fg 5.4.

Score 1: Minimal expression. The mental eminence is smooth, and there is little or no projection above the surrounding bone.

Score 5: Maximal expression. Mental eminence occupies most of the anterior portion of the mandible with obvious projection from the bone surface.

__Additional Mandibular Features__:

Two additional features of the mandible can be used to estimate sex: the gonial angle and the horizontal ramus. A ‘typical’ male mandible is shown in Fg 5.5. Two examples of female mandibles are shown in Fg 5.6.

The Gonial Angle: Males generally have rugose gonial angles, which have a more acute angle and are often everted (Acsádi and Nemeskeri 1970: 75-8; Kemkes-Grottenthaler *et al* 2002; Novotný *et al* 1993). Females tend to have have more gracile gonial angles that are not everted and have a more obtuse angle. Acsádi and Nemeskeri (1970: 78) suggest that a gonial angle of 125° or greater are indicative of female sex.

The Horizontal Ramus: Males tend to more robust mandilbes and females more gracile. Along with this, the horizontal ramus tends to me narrower in females and wider in males (Acsádi and Nemeskeri 1970: 78). In addition, the posterior border of the mandibular ramus has been shown to have sex characteristics related to an angulation at the occlusal molar level (Kemkes-Grottenthaler *et al* 2002, Loth and Henneberg 1996, 1998, Oettlé *et al* 2005).